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FORTY-FIFTH and FORTY-SIXTH
QUARTERLY REPORTS
OF THE
PENNSYLVANIA
Board of Agriculture.



INSTITUTE ESSAYS.

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FORTY-FIFTH AND FORTY-SIXTH QUARTERLY REPORTS OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE FOR THE YEAR 1891.

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	1894

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Lehigh	J. P. Barnes	Allentown	1894
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GRAZING vs. GRAIN CULTURE.

By WILLIAM TOMLINSON, *Langhorne, Penna.*

(Read at Langhorne Institute.)

The subject, "Grazing against Grain Culture," whether intended as a comparison between a system of extended grazing for the production of beef, mutton, wool and dairy products, as against a system having for its main object the raising of grain to be sold in the natural state; or whether it was to be considered in regard to the best method of producing these concentrated products, mainly by grazing or by the help of a system of soiling and feeding of grain, roots, ensilage, etc. So far as the advantages or disadvantages of our situation are concerned, there seems as much competition in the one as the other.

While there was a time when eastern farmers had a control of the great eastern, or seaboard, markets for many products—some being considered too bulky, some too perishable, to be transported, the great transportation interests of the country have overcome these obstacles, and to-day there seems to be no distance, no weight, no bulk and no delicacy of texture but what has been provided for.

Wheat and corn from the plains of the north and west, beef from Texas, butter and cheese from the prairies, fruits and wool from California and the tropics, vegetables from all points where soil and climate are more propitious than our own. So it matters not in what direction our efforts are applied we encounter the competition of the most favorable spots of the universe for that especial product. Therefore, we may as well at once set ourselves to meet this competition, and so arrange our surroundings.

Admitting this, it would seem that the motto for us to adopt would be best expressed in the word "concentration." Deeper, more thorough, more effective, seems to be the only way out of the shadow cloud of debt and despondency that seems to have settled over the prospect of the average agriculturist of our section.

The domestic animals have from the first been an essential factor in the providing of food for the human race. Since the patriarchs of old roamed listlessly over the plains of Syria and the Holy Land, they have been part of man's estate, and an indispensable factor in the great work of turning grass and grain into food and raiment for his subsistence and comfort. In primeval times, when the world was wide and men few, it was sufficient to move the herd from one point to another, to fatten, slay and feast upon them, without much concern as to any profit being developed.

And in our own country we are just emerging from this state of things. Even yet we are in direct competition with the natural grasses of the grand plains and virgin soil of the west, aided by an improved breed and strain of cattle bred with a view of making them profitable under these conditions. Our great system of steam transportation has made these products directly available to the denser population of the east, and the eastern farmer, just as he had prepared to furnish this great population with its needs, having fixed the price of land with that end in view (having taken this into his calculation in buying), finds himself confronted with the fact that farmers living in almost any part of the country are fiercely competing with him for this market.

Admitting, then the necessity of our domestic animals in our agricultural economy, the question of how best to provide for them, that they may provide for us, becomes an all-important one. As the holdings of the farmers grow less, as the system of cultivation becomes more thorough, the extravagance of allowing our cattle to roam over them becomes more marked, and only on those parts that are not available for culture do we feel at liberty to allow stock to roam. And upon those waste places our improved stock refuses to be kept profitable. Our delicate Jersey, the queen of our dairy, already refuses to be put off with coarse swamp grass or rocky hillside herbage. To be profitable, she must have rich, succulent grass; be carefully housed and fed; in short, be taken into the household as one of its equipments. While other breeds still do fairly well upon these same waste spots, the drift of things is toward a more thorough and a more intense system of keeping and feeding, when it will be considered poor economy to keep our domestic animals in the meadow or on the hillside, defending themselves from the flies, pulling their own grass, exposed to the sultry sun of the summer or the chilly storms of the autumnal months.

And with this higher system of feeding comes the necessity of a more thorough and effective method of utilizing the waste and returning it to the soil. In nature's great laboratory there should be no waste; therefore, a perfect system of agriculture will not impoverish the soil. Man's labor should be so aimed as to aid nature in the unceasing round of creation and decay, and the return to the soil those elements taken from it for our subsistence. If once learned and practiced, there should be such a system as would afford all the essential elements of success and continued fertility to our soil. When such a system becomes perfected, we think with our improved appliances for culture, cutting, curing and feeding the products of the soil, the indiscriminate cropping of our grasses and trampling of our soil, in season and out of season, by our cattle, will have no part. We shall find our profit in keeping fewer of them and waiting upon them more attentively. The great obstacle to this at present is the scarcity of careful, patient labor, which such a system demands; but time and circumstances, aided by the ingenuity of man, will bring it about.

At present the essential factor in the saving and proper application of the waste of our stock and dairy seems a sufficiency of good absorbent, the great want of many, if not most, farms being more litter and bedding for stock and barnyard, and its quicker application to the soil or its more perfect protection from waste. There is scarcely a farm that could not double the value of the manure product, with a sufficient amount of straw, or its equivalent, aided by its better protection from the weather until applied.

While this seems so important, the higher system of feeding and forcing our stock furnishes a good market for all the grain and straw our common rotation produces. Right here we are confronted by the fact that the growing of grain seems to be the least profitable part of our agriculture. The market of the whole world seem to be full and prices below the point of profitable production. To make our high-priced land profitable, we must produce more abundant crops, at a less proportionate cost. This is only possible by adding to its fertility. How to do this without increasing our invested capital seems to be the question. Grain growing alone certainly does not offer the solution; it is too exhaustive on the soil for the price.

In its prosecution we encounter the competition of a small empire of

virgin soil, easy of cultivation and of access, with means of transportation beyond the dreams of our fathers, where armies of men engage in the single industry of its production with all the improved appliances of modern husbandry and without scarcely any home market.

Is grazing any more likely to bring the desired result? How often does the stock raiser or feeder find his supply of forage cut short by drought or unfavorable weather, his stock stripping his place of all surplus growth, his means of utilizing the waste and returning it to the soil nowhere, his market glutted by those in similar circumstances forcing their stock upon it? Here, too, we meet the competition of our great western reserve, where as yet the land is practically free and the natural grasses abundant with ample means of transportation.

The area of the grain-producing country of the world, especially of wheat, has and is yearly increasing at such a rate that if we did really wish it we could scarcely hope to realize the prices that have been obtained in times past.

A few years ago California was a surprise in the production of wheat; her overplus seemed to rule the market. Since the northwestern portion of our country has developed this industry to such an extent as to cast California quite in the shade, while Australia and India make the Eastern Hemisphere self-dependent in this respect. And now Brazil, with her immense agricultural resources under the impetus of republican institutions, will soon be filling the markets of the world with her products. Her great grass-covered plains will fatten stock of all kinds, while other sections of the new South America will do their share in feeding the people of the universe.

With wheat at fifty or sixty cents per bushel and beef of the first quality at three cents per pound, may we not look for the millenium in that direction whether we will or not? Therefore, considering all things as they seem offered, I should say that in the case of "Grazing against Grain Culture" there was not a true bill; that our best and most promising outlook is in the unity of the two systems, not particularly in grazing as commonly expressed, but in the rearing, feeding and keeping of all kinds of domestic animals, in conjunction with grain and root culture, with a view to the production of all forms of food and raiment products possible—selling less in the raw state, keeping the best improved stock of all sorts, with more careful attention to the return to the soil of all waste in its most available form, relying not on less production in other parts of the world, but on a gradually growing home market for those products that are now sent abroad in competition with our own, to give us again a surer control of our own home market, that our land may be proportionately as valuable as of old—when the agriculturist of the country will again be the wealthiest, most independent and happiest man to be found; when our transportation companies will find their best interest served, not by hauling produce from the west to the east and manufactured goods from the east to the west, but from the country around to the nearest city, and from city to country back again; when all through and over our vast territory every section will find its own home market the best and most reliable; when every rural community and almost every country home will be nearly self-dependent, and farmers cease to buy so largely of those products that can and should be produced at home, purchasing mostly of their neighbors, that the money spent may quickly return to them again, that the labor and cost of such gigantic transportation may be saved and our business be made correspondingly *more profitable*.

THE OBJECT OF FARMERS' INSTITUTES.

By M. R. BASHORE, *Vandyke, Pa.*

(Read at Juniata County Institute).

Mr. President, Ladies and Gentlemen: I am before you to state to you the object of these farmers' meetings or institutes. I may not be able to state satisfactorily to all the primary object of these meetings, because we as farmers look at things so differently. Some will no doubt come here out of mere curiosity, while others will probably come more for pleasure and pastime, without having any special object in view, while still others will come to give instruction, and to receive instruction in reference to matters as to how best promote the interests of the farmer. Our motto should be to become better men and better women, to become better enlightened and better informed in reference to our condition in life, and to elevate and promote to a higher standard manhood and womanhood. We should nourish, cherish and cultivate sociability among farmers. Without these social qualities or characteristics these meetings will not be a success. If the right and proper view will be taken of the object of these farmers' institutes there will be a large field opened for thought, as the conditions of the farmers life are so varied. We are made up of different constitutionalities, different dispositions and different temperaments. We differ in opinion because we have been differently educated, and differently instructed, and differently informed. We differ in judgment because of a lack of proper knowledge. We differ in social or moral qualifications because of a lack of courtesy and proper training. We differ in action because of a lack of ambition, or courage, or fortitude. We differ in reference to methods and plans of successful, and economic, and practical farming, because of a lack of experimental knowledge. He who stands in opposition to the interests of these farmers' meetings, when the object for the general welfare of all is the prompting motives, lacks good judgment, and does not entertain the social qualifications he should otherwise possess. The man that thinks he knows it all, and needs no instruction is only exposing his ignorance, and will stand alone and forsaken when a friend is needed.

The farmer's happiness depends a great deal on his actions; his success depends very much on his judgment, discretion, economy and industry. The object of these meetings with the farmer should be, to enlarge his understanding and broaden his views on general farm topics, and the necessary information obtained as to the conditions surrounding him, both financially and practically, and as to the best methods of farming. Some men labor under the mistaken idea that a farmer does not need a scientific or systematic, or even a practical knowledge of farming, to be a successful farmer. The intelligent and successful farmer will tell us different, however. He will tell us that by actual experience he has discovered that it requires careful study of the soil to know what kind of grain will be best adapted to the different soils, hence the necessity of educating himself suitable for the requirements of his occupation. I do not wish to reprove or to criticise any one for entertaining opposite or peculiar views from our own, but it is a notorious fact that there are always some people who will oppose anything that has a tendency to elevate or promote the general welfare of mankind; hence, the influence of such people is of

little use to the advancement or improvement of the object of institutes. When we take a review of the lives of some of the most successful and influential farmers, and get at the secret of their success, we will almost universally discover that they have been blessed with a good wife. Now, I do not want to encourage any of these old bachelors to get married, but I will take the liberty to say right here that in nine cases out of ten, where the farmer has been successful in accumulating wealth, and making his surroundings and the home circle happy, there the wife has been an important factor. And I will say more, I honestly believe that many a good wife has been discouraged, and her "otherwise happy life" made unhappy and miserable, by bad and careless and indifferent husbands. Perhaps I am somewhat digressing from the subject, but allow me, fellow farmers, to tell you, this world would be a mighty lonely place without the ladies. Even these farmers' institute would soon become lifeless were not the ladies admitted. Here we can interchange ideas and views concerning general farm topics. Here it is proposed we may discuss, "without fear", though with freedom and fairness, national and state policy that particularly concerns the farmer, to develop a true and fair basis for organization among farmers. It will not be expected that I enter into the details of the various questions that will likely come up at this institute for discussion, but will simply give an outline of some of the supposed causes of the depressed condition of the American farmer. That there is a just cause for the farmer to complain is apparent and beyond a reasonable doubt. The intelligent farmer has observed in the history of our country, within the last fifteen or twenty years, some radical changes that have taken place, both financially and politically, the effects of which have been differently known and felt by the farmer. The causes have been various and the results obvious. It is not only the growing of crops—such as wheat, corn, oats and potatoes, live stock and fruit—that the farmer should be interested in. These, of course, should, and do, engage a live, thrifty farmer's attention, and the farmer that is governed by a system, and keeps a close watch, and exercises good judgment, is not the continual grumbler; but, on the other hand, is of a cheerful mood and of a lively disposition. The thrifty and intelligent farmer, "and that is what we all should be," may meet times of discouragements, when losses will cross his pathway and misfortunes overtake him, yet his occupation is certainly an independent one. Some one will ask, where is the farmer's independence? This should be considered one of the important questions of this institute. While it is true that some men will prosper (I mean farmers,) others, apparently with the same judgment and in the same calling, are always in the line of adversity. We see here and there a man who is apparently blessed in all his undertakings, while others are, seemingly, always met with misfortunes. These things are lessons for the farmer and should suggest food for the mind, which is also worthy the consideration of this institute. Fellow farmers, these meetings should not only engage our attention as the best methods of successful farming. There are other interests to be considered and taken into account, which are of vital importance in order to advance the prosperity of the farmer. Judging from the financial and political condition of the farmer it is evident that he has been too indifferent concerning his interests. However, he is beginning to see and feel, that there has been a sad mistake somewhere, and that some one has pulled the wool over his eyes. Hence, he is beginning to look after the causes of the cause,

which it will devolve on this institute to give light on. The intelligent and wide awake farmer, in reading up the news of the day, will discover that there are a good many supposed causes of the present depressed condition of the farmer, some of which I will name and leave to the intelligence of this institute for discussion. 1. Because the American people have got into a habit of extravagant and expensive living in time of plenty, and when the crisis came, the beginning of failure came also, hence the depression. 2. Because of unjust, inequitable and unequal taxation. 3. Because of trusts, corporations and monopolies. 4. Because silver has been demonetized as a standard, making gold the only standard, causing a shrinkage in currency, thereby causing a depreciation in values. 5. Because of an over-production. 6. Because too many national banks are in existence. 7. Because of a lack of confidence in the management of the government. 8. Because England can come to America and buy our silver dollar for about eighty-two cents and pass it for one dollar for India wheat, thereby getting their bread stuff for less than the American farmers can produce it. When this institute has analyzed and digested all the above named causes satisfactorily, and all the general farm topics, and healed up all the financial and political breaches, we will be ready for another farmers' institute. The universal cry among farmers is, farming don't pay. Why don't farming pay? Well, because farm products are too low in price. Why are farm products so low in price? Will this institute say? What is one of the important objects of farmers' institutes? We want to get at the root, and get the quintessence of the trouble; get on a fair basis for improvement; get out of the old political rut of despair. It is said, and truthfully, too, that the farmer is the bone and sinew of the country. If that is true, he is certainly responsible for his actions. We are not placed in this world simply to sit on the stool of do nothing. We are beginning to see and feel that our sacred rights have been trodden under foot by designing men. The time has already arrived when the intelligent farmer will not be satisfied to allow himself to be stuffed by the average politician. He is beginning to see and feel that he has an interest at stake, and that he is individually and personally responsible. Is the farmer capable or qualified to have a voice in the formation of laws which are to regulate his financial interests? Will this institute say, why are not the farmer's rights and interests protected? Why are not his honors respected?" Fellow farmers, here is a large field open for thought which should not be overlooked by this institute. It is all right to study and adapt the best methods of farming, but I wish to tell you there is a principle underlying all this that should be an important factor in this institute. If my method or system of farming is not making my condition in life better and my life happier, then I should look after the cause. If my neighbor farmer is succeeding and prospering better than I am, then I should look after the cause. If all efforts to prosper are in vain, then I should inquire after the cause. That is one of the objects of these farmers' meetings. That is what we are here for, to get light on these questions. Have you not, fellow farmers, discovered, in discussing matters concerning our interests, exchanging or interchanging ideas and views, giving and taking each other's methods and plans, as to how most successfully to manage our farms, have been lessons of profit. These meetings should be a source of both pleasure and profit to us, that we can, as farmers, have these social gatherings, though we should be prompted by a higher and loftier motive than to

simply gratify our own notions or desires. We are here to give and receive instructions as to the best methods of farming and solve some of the problems in reference to the depressed condition of the farmer; to speak of his financial and political situation; see how we may best promote the general welfare and interests of the farmer with the least possible expense, hoping that no other motive has prompted us. Let this be the spirit of this meeting and we will have a pleasant, profitable, instructive and successful institute.

THE EXHAUSTION AND RESTORATION OF OUR SOILS.

By H. W. NORTHUP, *Glenburn, Pa.*

(Read at New Milford Institute.)

The topic assigned me is considered a practical one in many sections of our country. It is unnecessary for me to attempt to enter into a discussion of what the soil is, but simply state what it is said to be. The Book of books, in its very first chapter and verse says, "In the beginning God created the heaven and the earth." It afterward says, "And God called the dry land earth." "And God said: Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after its kind, whose seed is in itself, upon the earth; and it was so." The word soil, is mentioned once in the Sacred Scriptures. The Prophet Ezekiel in speaking of a vine, says "it was planted in a good soil." Geologists say that the earth was a mass of stones hurled against each other, and grinding off their substance, formed a basis out of which a soil was formed. Webster, in his popular dictionary, says that "soil is the upper stratum of earth." It is certainly true that with the successful farmer it does not make so much difference what it is, as what it will bring forth under proper treatment. The treatment of our soil, then, becomes the practical part of this topic. The first consideration is, its exhaustion.

We are told that man was made upright, and to a large extent he is considered upright in his dealings to this day. Nevertheless, it is also true that he has become very destructive in his habits as a tiller of the soil. The term exhaust, intimates that the soil was originally good and productive, and did furnish bountiful subsistence for man and beast. Who then has brought about this change? Who has made the barren fields, and unproductive farms in various parts of the great Commonwealth of Pennsylvania? Man is very loath to implicate himself in the answer, and he says surely, I am not a sinner above all men that dwell in the Keystone State. My farm is not a worn-out farm. I have not been wasting my time and my energies for forty or fifty years, and returning comparatively nothing to my soil. I am not the man whom the professor and chemist in the agricultural journal accuses of robbing the soil all these years. My farm is a good farm. It is a good farm. It has a hard-pan subsoil, and is not leechy. It holds its productive qualities. My land is not poor. It only wants plowing up again, and plowing a little deeper; then it will be all right. The reason I did not get a good "catch" of grass the last seeding was that the weather was too hot and dry and it did not take. The reason

the little red sorrel is there, is, that something must grow, and that got started first. That is all there is about it. It is true I have sold off hay and grain, and a little beef and pork as we are in reasonable distance of a good market, but what would my farm avail me if I did not? I would like to have my literary friend, who is so much disturbed about the poor farm, tell me what a farm is for, if he objects to selling off the products. I have taxes both on my real estate and personal property, to pay; and they are not small either. I have farm implements to purchase, and I have hired help to pay. I have doctor bills, incidental expenses, and benevolence to meet. I have family expenses all the while, and it's my right and privilege to live as good as anybody. How shall I meet all these enormous bills and expenses, and not sell off the products of the farm? I want these vital questions answered, for I perceive that Young America is getting ideas greatly advanced about farming at this day and age of the world, and I confess that I do not understand them. The professor, in speaking with me, uses so many chemical terms that, rather than to expose my ignorance, I listen in silence, and we separate with my mind so bewildered that the opportunity has availed me but very little practical knowledge; and yet I am aware that it has been largely my own fault. The fact is, "there is more truth than poetry" in some of these statements. The farmer's expenses are enormous, and he must have something to sell, or he will, in a short time, become bankrupt, and the sheriff will make all the sales and he must dig out. It is a blessed good thing that the farmer understands this part of it. And he must understand more in order to make a complete success of his business.

Prof. J. P. Roberts, superintendent of the Cornell University farm, recently made an estimate of the produce taken from one acre of average farm land, in the last fifty years. He said, without any hesitation, "We have been robbing our soil." What has been the rotation of our crops? Three years in grain and two years in grass. What amount of hay have we taken from an acre in fifty years? One hundred and thirty-one dollars' worth. What amount of wheat and wheat straw? Seventy dollars' worth. What amount of corn and corn stalks? One hundred and thirty-six dollars' worth. What amount of oats and straw? Sixty-seven dollars' worth. What has been the total amount taken off during these years? Four hundred and four dollars' worth. How much have we returned to that acre in the fifty years? Perhaps not one hundred dollars' worth. All this amount taken off, and not one-fourth of it returned; and yet we hear farmers saying all over the country, that their farms are growing better. The fact is, our past wasteful style of farming will never make them better. It is written in unmistakable signs, on the majority of our farms in northeastern Pennsylvania, "wearing out;" and in many instances, far worse than that for they are already substantially worn out. The three essential elements of plant food, nitrogen, phosphoric acid and potash are gone. Our slack and indifferent style of farming permits them to escape from our barns and our yards with wondrous ease, before they are placed in the soil. The voidings of our stock are thrown under the eaves of our buildings, and their fertilizing ingredients are washed into the public road, or passing brook, before we get ready to use them. Many times we allow our fertilizer to fire fang or burn up the nitrogen, which is the most expensive ingredient in the whole pile. We see with our own eyes this effectual work of destruction going on, and yet we are apparently undisturbed by the consequences. We plow our steep side-

hills, or at least some of us do, in the autumn, and make it very convenient for the early, and sometimes heavy, spring rains to wash the most valuable part of our soil where we can never derive any further benefit from it. Many of us place our farm stock in winter quarters with cold and uncomfortable stables; and some of us give them shelter by the fence along the hill-side, and then complain that there is no use of trying to compete with the western farmer in the production of beef. We murmur about the price of milk being so low, and yet think it is a great undertaking to drive to the nearest town, pay our dollar and join the Farmers' Milk Union with the view of getting a living price for our product. We sometimes join with the loafers about the country store, smoke a cigar, or whittle a stick, and there tell our comrades that the price of butter has got so low that it's not worth our time and attention, and we will not tie ourselves up to care for those dairy cows. And yet we claim to be farmers. But what have these cows, and this stock to do with the exhaustion of our soil? We answer that they have everything to do with it! The farmer's success in his business lies wholly in a three-cornered enclosure. It is this—more stock, more food, more money. It is true there is something more to live for than mere dollars and cents, and a man can be a man, if he is poor, but it is wonderfully inconvenient. Fellow farmers, we can never make a good, honest living, much more any money, on a farm while the soil is exhausted. It is not the number of broad acres that make our farms valuable, but it is the plant food, and fertility of the soil, that makes those acres desirable. If we have them rich in fertility, nicely located, and thrown on the market, just as long as there are farmers they will be in demand, and they will not go begging for a purchaser.

The next consideration of my topic is, if the soil is exhausted how can we restore the fertility? We answer, that nature's plan always works the best. After the earth was made a plant was produced to grow upon it. The work of man is to nourish the plant. Professor Roberts, to whom I have previously referred says, "in the autumn the foliage of the plant fell upon the soil and fertilized it." Moreover he says, "let us imitate the example by spreading our fertilizer over the surface in autumn." Get a plant to grow. One of God's best gifts to man is the clover plant. Its roots deeply penetrate the soil. It feeds largely upon potash and phosphoric acid. When it is cut down and removed from our soil it is said to carry with it more food elements than any grass plant, and yet leave more near the surface for the development of the plant that succeeds it. Its roots are said to be as valuable for fertilizing purposes as its branches. So we can appreciate its worth, and we cannot afford to do without it. If we can get this plant to grow and thrive, we have answered the question, and can restore the fertility. There is no question about it. If we plow this crop under when it is in full bloom we have added fertility to our soil. If we experience difficulty in getting it started, we can succeed by giving the soil a few hundred pounds per acre, of good commercial fertilizer. I know that will do it having experienced satisfactory tests. Unleached hard-wood ashes applied to the soil will also do it. In northeastern Pennsylvania the great secret of restoring the fertility of the soil, is in keeping of all the farm animals that can be maintained on the premises. God gave man dominion over all the beasts of the field, and he gave him that dominion for a wise purpose. The ancient patriarchs succeeded with their flocks and herds. They sought a coun-

try that was rich in pasturage, and they became rich and prosperous themselves. In many respects at least, it becomes us to imitate their example. We cannot furnish so many acres of pasturage for our stock to stroll over; but we can build the silo, and we can fill it with good, palatable and substantial food. We can place our animals in comfortable stables, where they will not waste that food. We can furnish ample food in this way for double the amount of stock that we could if they ran at large. We can increase net profits in milk and butter and at the same time we can constantly increase the fertility of our soil. The elements of fertility contained in our fertilizers depend largely on the quality of food fed to our animals. Scientific feeders claim that cotton seed meal in connection with good ensilage, or that which contains the ears of corn in full sweetness, stands at the head of the list. The Cornell University farm has fed this ration in connection with wheat and malt-sprouts, and their farm the last season produced eighty bushels of oats, and nearly one hundred bushels of corn per acre. They have buildings provided for the storage of their fertilizer, and especially for preserving its liquid parts, which are pronounced the most valuable. I think this farm contains less than 150 acres. I recently saw a statement that 466 tons of fertilizer produced in a single season on this farm, by forty-seven full grown animals, was worth in commercial value \$1,682, or about \$35 per head. No such value, however, could be reached by the use of ordinary farm foods. It is produced by highly concentrated food, and is of the highest value. The farmer must live from what his land produces, and if its fertility is growing less year by year, its productive capacity is correspondingly diminished, and the farmer must either content himself with a poor living, or else work the harder for it. The farm that I have referred to was formerly a worn-out-farm, but now is in a very high state of cultivation, and is producing enormous yields. Only a few years ago Mr. J. E. Rogers purchased a worn out farm in Broome county, N. Y. He moved upon the premises and commenced with dairy cows to produce milk. He is now keeping 100 cows, six horses, five colts and fifty sheep on that very farm, or at the rate of one cow for each acre of tillable land. His cows the past season have netted him, not including the cost of land, over \$90 per cow. He is growing fodder corn on this previously worn out farm at the rate of eighteen tons per acre. If the State of New York, with a cooler climate, and shorter seasons, and originally no better soil, can make worn-out farms produce such yields as those I have mentioned, surely the Keystone farmer can do it, and it is his highest privilege to imitate the successful example of his prosperous neighbors.

PROFITS IN FINER PRODUCTS.

By ALVIN H. TOMLINSON, *Brownsburg, Pa.*

(Read at Riegelsville Institute.)

In looking over the market reports from time to time, I have been struck with the wide divergence in the price of different qualities of the same article. For instance, in the quotations for butter on January 20, 1890, the wholesale price ranged from 7 to 34 cents. Now, while

the 34-cent article is known as prime butter there are still finer grades in market. This fact reminds me of a canvas sign in front of a Bowery hat store which reads something like this: "Fur hat, \$1.00; good fur hat, \$1.25, fine fur hat, \$1.50; real fur hat, \$2.00." So with butter. The prime retails at 40 cents in Philadelphia markets; the finest quality from this county retails for 65 cents, and the gilt-edge butter of the Darlings, of Delaware county, retails for 90 cents per pound. I do not doubt that the butter of either of the two last classes is uniformly better than that of the first. But the additional expense, the favorable circumstances and the extra care given through a long period of years, that is necessary to produce such butter makes it impossible for any but a very few to reach their high standard. As this is as true in regard to other products as butter, we will consider only the profit to be obtained in raising a first class over a medium good article, using market quotations for the same day as already cited, and considering the ordinary articles raised on a hundred acre-farm.

The quotations are as follows: Eggs 14 cents a dozen for good, 18 cents for prime; wheat, 75 cents per bushel for good, 88 cents for choice; No. 3 corn sold for 36½ cents per bushel, No. 2 for 38 cents per bushel, with no quotations for No. 1; oats, 28½ to 29½ cents per bushel; potatoes, 55 to 60 cents per bushel; timothy hay, \$10 to \$13 per ton; while beef, pork, veal, mutton and poultry varied from two to four cents per pound. A few extra cents on a pound of butter, a dozen eggs or a bushel of wheat seems like a very little, yet if we obtain the few cents on all of these it will create quite a sum in the course of a year. Let us see. There are few one-hundred-acre farms but what keep at least ten cows, producing 200 pounds each, or 2,000 pounds for all, which, sold at an increase of five cents per pound, amounts to \$100. Fifty hens, laying ten dozen eggs each, sold at increase of four cents per dozen, amounts to \$20; and producing 400 pounds of poultry at an increase of two cents per pound amounts to \$8. Then there should be 300 bushels of wheat sold at an increase of six cents per bushel, \$18; ten tons of hay, at an increase of \$3 per ton, \$30; 2,000 pounds of pork, sold for one-half cent per pound more, \$10; 300 bushels of potatoes, sold at an advance of five cents, \$15. Besides there would be a number of small profits on some fresh vegetables and fruits or on an occasional veal or lamb, which would easily amount to \$25, making \$225 in all. This is only a moderate estimate which any one may reach; the possibilities are much larger. Nor is this all. Efforts to raise finer qualities almost invariably increases the quantity. There are some exceptions. You cannot raise as large a crop of Early Rose potatoes as of Burbanks, yet the former will always bring the higher price. But attempts to raise a finer quality of Early Rose enlarges its yield. This is still more noticeable with vegetables, fruits and grain. A silicate of potash for asparagus produces quicker growth, a finer quality and a larger quantity. A highly nitrogenous fertilizer for celery and other vegetables, and a potash for fruit has the same effect. A high grade of phosphate applied to wheat gives us a plump grain, which fills the half bushel rapidly and out of which the miller can get a larger per cent. of flour. It is an important point, in regard to cheapness at least, to give the growing crop the kind of feed it especially needs. But let me say right here that I believe that barn-yard manure must be the staple fertilizer in raising large quantities and good quality of any article. With this as a foundation, fertilizers to give a

larger per cent. of a certain element and a vigorous start can be profitably used.

To obtain the highest price for an article, much depends upon the care and skill with which it is prepared. A good article is a great aid in accomplishing this. It is much easier and quicker to dress a fat chicken without a tear or bruise, than a lean one. A workman will bunch a basket of good large stalked asparagus, of some twenty to twenty-five stalks to the bunch, about twice as quick as he will a basket of old spindling stalks. With two articles of the same quality though, that which is made the most attractive, that is the cleanest, freshest and best arranged, will find the quickest purchaser at the best price. No especial direction can be given on this point. Every one will have to follow their own taste and artistic skill. Still, after a certain form, style or mark is adopted it should be closely adhered to, as customers will soon learn to recognize and use the outward sign to judge of the true character of an article.

The question, "How shall we find the best market?" is a pertinent one. In answering, I would say, "Avoid the commission man as much as possible." Too often they make the same return for an inferior as a superior article, making up the loss on the former out of the profits of the latter. So sell direct to the storekeeper your entire produce, or better yet, in small quantities to the consumer. If a retail merchant finds that he can depend upon any one to furnish him with an article of superior quality and uniform quantity, week after week for several years, he will be willing to bid up well for that man's products.

Now that traveling by railroad has become so cheap and common it is easy for us to spend a day in the city among its merchants, looking for a suitable person to consign our goods to. But whenever practicable it is advisable to sell direct to the consumer. This method has many advantages; the main one though is that we can reap the profit of sale ourselves. This profit is frequently greater than the price received for producing it. We sell oats for a cent a pound and buy oat-meal at the rate of two pound for fifteen cents. We sell our beeves for three cents a pound and pay the butcher from twelve to sixteen cents for the same meat. Milk wholesales for from three to four cents a quart, while it retails for six, eight and ten cents. Another point: while retailing your main products of butter, eggs, potatoes, etc., you find a market for many little articles that you would never think worth wholesaling. Lima beans, sweet corn, radishes, turnips or pumpkins that you do not need for the table; apples, peaches or watermelons that would otherwise spoil, can be disposed of and help to swell your receipts. Then coming in personal contact with the consumer acts as a powerful incentive to make your produce a better article. They are quick to tell you of any defects that your goods may have, which if you are ambitious you will strive to overcome. You see articles nicer than your own, that some one else has produced, and you inquire the process of raising; so that attending market acts as a continual object lesson. Then you can deliver your produce in a fresher state than the store-keeper who has his goods exposed on the stall for hours at a time. A few hours of such treatment detracts immensely from the value of vegetables and fruits. In marketing ourselves, by gathering just before starting and carefully handling and packing, we can deliver goods in the nicest possible condition. This point alone should insure the highest retail price.

The south and west cannot compete with us in perishable articles,

as no way has yet been found to annihilate time. It is true that since the refrigerator cars have come into use there is little danger of entire loss. Still articles kept on ice, when exposed to the air, show signs of decay, proving that they have been injured somewhat, if not perceptibly. Should we not take advantage of this fact and confine our energies more to raising perishable articles? I might add one more requisite to obtaining a high price, and that is to market regularly a uniform or improved article for a number of years. He who is constantly trying to find something in which there is more money or a better market will never get the highest price.

In an essay read before the Langhorne Institute, James Branson says, that butter, milk and early spring lambs are three things that the eastern farmers can produce with profit. To these I think we might add certain lines of vegetables, for even in seasons when there is glut it lasts such a short time that the average price is good; and an over supply effects the best but little, as it is only the poorest that is dumped into the river to relieve the market. Perhaps in the production and sale of butter there is more room for improvement than of any other product of the farm. Mr. Gilbert, of New York, says, of the 100,000,000 pounds of butter produced in the Empire State, one-third of it is not fit for the table. Be that as it may, there is plenty of room or improvement for all of us. My observation leads me to believe that butter that will grade above the creamery will sell the easiest. But like many of our other products, the profit of producing will frequently lie in the eight or ten cents that a pound retails for above the wholesale price. We have several times had to buy our entire feed for the dairy, and have found that the cost of producing a pound to be about the wholesale price, while by retailing we have received a fair profit. There is one feature of a dairy that is seldom taken into account, and that is a big manure pile. A large well kept dairy with plenty of hogs to utilize the skim milk, if care is taken to save their waste, will furnish us with the most essential thing for producing the finest quality of any product, and the rest of the work is easy.

CATTLE FEEDING.

By D. P. FORNEY, *Hanover, Pa.*

(Read at Gettysburg Institute.)

By the general term cattle feeding we mean simply the fattening of beef cattle for market during the winter so as to preserve the fertility of our farms. This subject has perhaps commanded the attention of the farmers of this locality to a greater extent than anywhere else in the state. Some thirty or more years ago, when the restoration of fertility to our exhausted fields first seemed to claim the serious attention of our scientific men, they regarded it as a very plain question, as easy of solution as an ordinary question of addition in mathematics.

All you had to do was to find out what the soil had and what it did not have, and then put back what it lacked, and thus again make it fertile. Then it was that George Waring wrote that "soil analysis must be considered the only sure road to economical farming." And

then, too, it was that Horce Greeley, Solon Robinson and a host of writers in the New York *Tribune* and elsewhere were loud in their denunciation of the "stupid farmers," who would not learn what they "knew about farming."

In England those patient and practical investigators, Messrs. Lawes and Gilbert, proceeded in a truer fashion to investigate this question. They analyzed the wheat and turnip plant, compounded fertilizers made up of exactly such constituents and in such proportions respectively as they found in the plants, and then applied them separately to each plant, and the results were satisfactory; but when they reversed the order and applied the turnip fertilizer to the wheat and the wheat fertilizer to the turnips, the results were equally satisfactory. Since then hundreds of experiments have shown similar results, and prove that the operations of nature are sometimes subtler than the chemist's art. At her feet we must stand with uncovered head and humble mein and learn perhaps till nature dies and all science is swallowed up in humble faith or infinite knowledge.

And now the mistakes made in learning how to feed the soil are being repeated in learning how to feed live stock. German investigators have made very plain the chemical constituents of the animal and also those of the food required. They have also ascertained the proportions which one set of constituents should bear to the other in the feeding rations, all of which is useful and valuable information to the feeder. But some of their American followers seem to be carrying the matter a little too far. They are compounding rations out of all sorts of feeding material and seem to go on the presumption that because it is chemically correct it must be practically. An exceedingly unsafe conclusion to draw in agricultural matters, as many of us have learned by experience. In feeding animals, still more so than feeding plants, we have a living organism to deal with on the one side and all of its peculiarities of constitution, health, age and surroundings may affect the result. There are, no doubt, farmers here who remember have seen one cow in a stable break off in her milk and get fat when feeding her corn, whilst another one by her side would increase in her milk and stay poor on the same diet.

Judgment and experience are as necessary here as elsewhere, and a routine cattle feeder will be no more of a success than a routine professional man.

My object, however, in this essay, is to call attention to the relation which this industry holds to the farmers' success in his business at this time. There was a time when cattle feeding in itself was profitable, independent of all relative considerations. Cattle could then be bought for two dollars per hundred less than they would fetch when fat, whilst feed was fully as low then as now. Then it paid to feed; just now, with feed somewhat higher than it was then, the farmer is asked to feed for from fifty to sixty cents per hundred advance, and is complacently told, by the drover and butcher, to look to the manure for his profit. I cannot conceive of anything that looks more like a treadmill operation than this. You take one step up when you raise the corn in the summer; the next spring, when you sell the cattle, you take that step down again, and there you land, right in your clover field where you were the year before you began plowing for corn.

We farmers make a great mistake in not calculating as closely over the details of our business as commercial men do over theirs. Perhaps this is one reason why they generally outstrip us in the acquisition of

wealth. Let us now calculate a little over this matter. Any one who has carefully looked over that volume of the report of our State Board devoted largely to commercial fertilizers, could not help noticing the great unanimity of testimony in favor of fertilizers containing phosphoric acid. This ingredient is the most valuable, if not the only valuable one, to us, for it is the one most generally lacking in our soil. It is probable that we generally have enough of potash. According to the best analysis I have at hand, a ton of barn-yard manure contains about seven pounds of phosphoric acid. The average yield of a steer during the feeding season is about three tons, so that we get back twenty-one pounds of the phosphoric acid by feeding him. It will take twenty-five bushels of corn, worth, at forty cents per bushel, ten dollars; one ton of hay or its equivalent, worth also ten dollars, five dollars worth of straw and labor to feed him, making in all the cost twenty-five dollars. If, now, a thousand pound steer at four cents costs forty dollars, and when fat weighs twelve hundred pounds and brings four dollars and sixty cents per hundred, which is about the average during the last five years, he will then be worth a little over fifty-five dollars; that is, he will have fifteen dollars of the cost returned by the steer, leaving ten dollars as the cost of the manure. If, now, the other ingredients of the manure are of little value to our soil, as experience shows they are, then these twenty-one pounds of phosphoric acid are costing ten dollars, when the same money invested in South Carolina rock, at eighteen dollars per ton, would bring us more than six times as much. Is there not something in all this calculated to make a thoughtful farmer hesitate a little before continuing longer in a business which shows such odds against it?

At present we are literally making ourselves poor to keep our farms rich. Against these statements farmers, of course, will be ready to ask, How are we to keep up the productiveness of our farms? In reply, let me say the mere feeding of corn is a very slow way of adding to the fertility of the soil. One thousand pounds of corn contains only about twelve pounds of mineral fertilizer. Two hundred pounds of any good commercial fertilizer contains just about as much. Viewed from this stand-point it would therefore be much easier, as well as cheaper, to sell the corn and buy the phosphate; and if the object is to raise corn or any other crop, the truest economy would demand that we apply no more fertilizer than is just needed to produce the crop, and only of the kind which the soil requires to bring it to maturity.

This latter I take to be pre-eminently the agriculture of the present. The development of the present productiveness of the soil, which is often simply dormant for the want of a stimulant, in distinction from the indiscriminate restoration of fertility, which, though it may be effective, is too expensive.

The discovery of the nitrogen ferment claimed by some German scientists to be a fact beyond all doubt, has very much changed the aspect of our knowledge upon this subject. When Liebig published his investigations thirty or more years ago, he took strong ground against the assertion that plants got their nitrogen from the soil. Since his time many investigators have taken just as strong ground on the other side of the question; whilst others again frankly admitted they could not tell where it came from. Now, it seems to be clearly established that the supply of nitrogen increases itself in the soil by

some process very much like fermentation, when the proper conditions of heat, moisture, shade, etc., are present. This seems to explain what so long puzzled investigators, viz: That a crop of clover, which carries off a large quantity of nitrogen, often leaves more nitrogen in the soil, after its removal, than was there before it was grown. The clover promotes this fermentation. It is always most active in a soil filled with organic matter and in the presence of phosphoric acid. Indeed, it is asserted that if a fertilizer, rich in phosphoric acid, is sown in alternate drill breadths across a field deficient in phosphoric acid, it will attract the germs of fermentation from the unfertilized strip, and make the crop poorer there than it otherwise would be. So far as my experience and observation goes, I believe there is some truth in this.

Nitrogen combined with hydrogen forms ammonia, which is known to be a powerful stimulant of plant growth, and if we can succeed in keeping up the supply for our soil in the manner indicated, we have made a great advance in the knowledge of our occupation.

In looking over the last census I noticed a somewhat remarkable fact. York county is the second county in United States in the consumption of commercial fertilizers, and inquiry among the agents reveals the additional fact that the sales of South Carolina rock are increasing in a greater ratio than those of other fertilizers. In a large part of this county cattle feeding is almost the universal rule, and yet these farmers find it necessary to buy large quantities of phosphoric acid to keep up the productiveness of their land, and their general testimony is that this fertilizer, applied in conjunction with barn-yard manure of any kind, will always produce satisfactory results.*

Side by side with some of the largest cattle feeding farms of that county, farms can be found on which cattle have never been fed, and yet their productiveness does not seem to be diminished. Into the history of one such farm recently I inquired with much interest. It is surrounded by farms on which large numbers of cattle have been fed for some time. It has been in the hands of its present owner, who is now over seventy and has always been a careful, painstaking farmer, for more than fifty years. During his time it has been limed twice, but commercial fertilizers have never been bought to any great extent. Nothing is sold off of it but grain. Its owner makes no more hay than he needs for his team and cows; all the rest of the grass is left on the field and plowed down. For more than fifty years this general plan has been pursued, and this farm is to-day as productive as any in the neighborhood. Two years ago, on a ten-acre field, it produced four hundred and seventeen bushels of wheat, and is now producing annually about one thousand bushels. It contains a little over one hundred acres. Certainly no cattle feeding farm is doing any better.

The point, then, which I wish to draw attention to is that the productiveness of much of our land can be kept up without cattle feeding, and, indeed, without the addition of any foreign fertilizer, and where

*Barnyard manure is not a well balanced fertilizer; it contains much too large a portion of nitrogen for the phosphoric acid which it furnishes; it promotes the growth of straw (at the expense of grain in many cases), and often is applied in such amounts as positively to reduce the yield of grain. York county farmers, who stall feed cattle and use the resulting manure, apply too much nitrogen and hence find the application of phosphoric acid, in the form of Dissolved South Carolina Rock, profitable and advantageous.—SECRETARY.

it is necessary to add fertility it can be done more cheaply by the purchase of the fertilizer than by the purchase of feed, as the case now stands.

We must distinguish between fertility and productiveness. A very fertile soil may not be productive, because of injudicious farming. The art of the true farmer is to develop its productiveness; and in no way can this be done more easily than by the proper care and use of all the organic matter produced on the land. Its return to the soil is a matter of the first importance. There are, no doubt, farmers here who have seen straw, chaff and such refuse as usually collects where threshing is done hauled out and plowed down for corn, give just as good results as where good barn-yard manure was used, and the explanation is that its presence and fermentation in the soil have developed latent fertility which otherwise would be inactive.

There is much about the development of the productiveness of soils, which is as yet imperfectly understood, and it is no credit to our colleges, experiment stations, etc., where so much public money has been spent, that so little has been accomplished in this direction. More brains and less politics would likely give us better results. Meanwhile, I take it, that the farmer who is closest in his observations of nature and her processes, and works nearest to them will, in the end, succeed the best. By the simple operation of her laws, fertility and productiveness are everywhere increased. On the prairies of our great west and the black soils of Russia, she has developed a degree of fertility beyond all reach of agricultural science. The all-prevailing law is, life, growth, maturity, death and decay, and out of it a higher resurrection; or, as the Omniscient Law-Giver has put it, "Except a grain of wheat fall into the ground and die, it abideth alone; but, if it live, it bringeth forth much fruit."

THE CARP AND ITS CULTURE.

By Dr. C. E. GOLDSBOROUGH, *Hunterstown, Pa.*

(Read at Bendersville Institute.)

Carp culture in the United States is of very recent origin, but worthy the attention of agriculturists as a branch of farm industry. That the rosey expectations of many of the earliest fish culturists in this country have not been realized is no evidence that there is not sufficient merit in the propagation of carp as a food fish to warrant its continuance where suitable sites for ponds can be found upon the farm. The enthusiasm that attends all new-born enterprises followed the introduction of carp into the United States and was only surpassed by the *morus multicalus* craze of fifty years ago, and yet silk culture is still carried on, but upon a more conservative basis.

The methods for raising carp, when reduced to a practical standpoint, are so simple and easily acquired by any intelligent person in a visit of a few hours to the ponds of a successful fish culturist, that I will not engage your time with a voluminous description of the various theories and technical phrases indulged in by those who aim to be ranked as scientists in the business, but simply call your attention to a few practical facts in pond construction.

Ponds should be built as much above ground as possible and never dug out more than is sufficient to secure the necessary amount of soil with which to construct the dykes or embankments.

These should never, if possible, exceed four or six feet in height and three feet in width at the top if made entirely of earth, as it will be found impossible to combat successfully the muskrat in more elaborate structures of earth. The bottom of the pond should be traversed by a ditch capable of thoroughly draining the entire surface which should never be injured for purposes of cultivation that at times should be done in such crops for which the ground may be suited.

Carp have been found native in none of the waters of America, although fish of the same species are common in all of them. The carp, like man, has his origin in central Asia and is indigenous to streams emptying into the Persian Gulf, and the history of the carp appears to be nearly as old as that of man, and although we have no descriptive accounts of their propagation before about the year 1227, A. D., when the monks of central Europe constructed dams, some of which were of immense size and yet remain and were assiduous in their culture in the more mountainous regions inaccessible to seas and great rivers where fish were plentiful; we yet have abundant evidence of an archaeological character that the Chaldeans and Assyrians had in their beautiful gardens fish ponds wherein carp disported themselves many years prior to the time that tradition ascribes to Abraham as being engaged in carving idols in his father's shop "in the land of his nativity in Ur of the Chaldees," on the banks of the Euphrates, and I doubt if in all the land there be anywhere a genealogical crank whose ancestral history is so well authenticated as these late importations to our waters.

The carp was introduced into England about 1504, but that country, being surrounded by seas where fish could be had in all seasons for the catching, the success was not phenomenal. We find that carp culture can only be made commercially profitable under circumstances that are rarely met with. Such, for instance, as the monks found in the mountainous sections of Germany and Europe, generally inaccessible to the ocean's supply in those early times where the lenten season created a demand for fish food, and where a dense population creates a demand for all kinds of food. This latter is the chief reason for carp culture in portions of China inaccessible to large waters.

It is a fact very patent, without any intention at alliteration, that neither flesh, fowl or fish can be produced without feed, and as the fish culturist in this country will always be compelled to compete in the market with the products of the oceans, great lakes, rivers and even small streams that are being stocked with good fish, where to secure them costs nothing but the catching, while pond fish must necessarily be fed; and though the carp is by no means a dainty creature in its tastes, there is no feed so cheap as that obtained by sea and other large water fish. This, with rapid and cheap transportation facilities that open up markets formerly inaccessible, will always be the difficulty to be encountered by those raising fish in ponds for market, and yet the advantages to the farmer who raises carp are such as money will not procure. He can at all times have his table well supplied with fresh fish for his own use. He will have his ponds of pure waetr for the stock in summer and from whence to fill his ice house with clean ice in winter for his dairy and family use. It is upon the pond also that the boy on the farm will learn to skate in winter, and in its waters

after the sultry day's toil in the harvest field learn to swim in taking his evening bath in summer.

It has been charged that the carp is not a good table fish. In reply to this I would say there are better fish than the carp. As venison is better than pork, so trout is better than carp, but as we cannot have venison we eat pork, and as we cannot get trout at all times we had better raise carp, as they are infinitely preferable to no fish at all. Perhaps if we had imported the culinary art of the Germans with the fish, among whom they are highly esteemed, we would prize them more highly, and at any rate the conditions under which they are raised, such as the character of the feed and water in the pond, will explain as much as the same elements of the pig sty or cow stable will for the quality of their products. The difficulties to be encountered are numerous and often discouraging. I lost my first supply, acquired after three years of much worry and considerable expense, by a freshet that swept over a badly-constructed dam. Since then I have overcome all difficulties but that of the muskrat, and these little pests are never ceasing, night or day, in their endeavors to let my fish out into the public streams, and they require constant looking after.

One of my acquaintances who has a fine set of ponds, traps them for his table and declares they are very fine eating. He says that it is only a silly prejudice that prevents their general use. I have never had a strong inclination to adopt his views or hunt them for any purpose but extermination, not even for their pelts, but believe if they were called anything but a rat, half of the objection would be overcome, and in fact they have no more resemblance to a house or field rat than an eel has to a snake, yet we eat eels and pronounce them good. An old acquaintance of mine in the south told me that muskrat was a corruption of muskwatz, the proper name; but I don't know where he obtained his authority. I find it profitable to feed them to the chickens, but no matter to what use you put them, it requires eternal vigilance to outwit them and extermination is the only remedy.

Carp culture is not without its romance and you hear a great many wonderful stories, true and untrue, told by some engaged in their raising. I, however, am not going to treat you to any of them, but will say that there is no time that I look forward to with more pleasure, even after years of experience, than my annual drawing off of my ponds, when thousands of these beautiful fish are drawn into a common receiver to be separated, transferred to winter quarters and table use and the fittest selected for next year's spawning purposes. If there be any love of sport or enjoyment in your make up it will crop out then, and you are ready to brave mud and water in lending a hand at the work.

A fish weighing from four to five pounds will deposit, on an average, about 500,000 eggs. This being the case, it is not surprising that ponds become overstocked very readily, and the question will present itself, what should be done with the fish, as it will be impossible to profitably retain them in the pond, and the sale for stocking purposes are very limited. Some culturists place small pike in their ponds to destroy them and then eventually make use of the pike. Where pike are hard to obtain a few small bass might answer very well, but it must be remembered that a black bass will swallow a fish almost its own size. Catfish, eels, turtles, snakes and wild fowl destroy a great many and it will be impossible to keep them out entirely. I have been in the habit of throwing out into the public streams large quantities of these surplus fry, and the streams leading from my ponds to great

Cenowago are about as well stocked as my ponds and afford fine fishing for the public. This also lessens the temptation for trespassing, and as I think I have shown it to be impossible to complete in the market with the natural sources of supply, no selfish motives should actuate the culturists in opposing the stocking of the public waters with these fine fish in a manner that will entail so little personal sacrifice.

METEOROLOGY IN ITS RELATION TO AGRICULTURE.

By CHARLES LAUBACH, *Reiglesville, Pa.*

(Read at Reiglesville Institute.)

The weather is one of the most important subjects with which the farmer has to contend. He may plow and prepare the soil, plant or sow, but if the weather be not favorable his labor and toil is for naught. Weather has existed on this planet since the beginning of time, and, as we shall see, has been made a study during all historic time.

The first authentic history of the study of meteorology is given by Moses in the second chapter of Genesis. Although we have evidence that climatic changes occurred and that storm centers and storm clouds, frost, heat, clouds and sunshine, prevailed long before this record, yet in this paper it is considered unnecessary to dwell upon that point. We will confine our remarks principally to the era or age we represent. That Noah and his descendants kept a record of storms, of drought, of clouds, of rain, and other phenomena connected with this science, is evidenced by a glance at sacred history. In Genesis, seventh chapter, eleventh verse, we read "That in the six hundredth year of Noah's life, second month of the year, and seventeenth day of the month, it rained and continued to rain for a period of forty days and nights," and Noah entered the ark on the self same day.

One hundred and fifty days after this rain and flood, we find that a wind prevailed and passed over the earth, and the waters were assuaged, and the rain restrained. After a lapse of eleven months more, the ground was dry. Further on we read, "That while the earth remaineth, seed-time and harvest, cold and heat, summer and winter, day and night, shall not cease." In the ninth chapter, thirteenth verse, the rainbow in the clouds is recorded.

How very much similar the record is like our own of to-day: Storms, floods, cyclones, rainfall, halos, heat and drought; but we miss the degrees F., the atmospheric pressure, the mean daily humidity, direction of the wind, velocity of the wind, dates of thunder storms, aurora, halos, solar, lunar, etc.

It may be well to note, while passing, that when Noah entered the ark, he had just completed an astronomical cycle or year. A cycle of 600 years contains exactly 7.421 revolutions of the moon and brings our section of the universe to the precise position existing six centuries ago.

Josephus, in speaking of the patriarchs, says that their lives were prolonged, so as to give them an opportunity to perfect the sciences of astronomy, geometry, etc., which they had discovered. Thus we find an accurate knowledge of these sciences prevalent centuries ago. So

accurate are many of these old time deductions that they vary not one second from these periods as now determined.

All will admit that we cannot have a knowledge of a subject without full and complete facts, at least some tangible record; for all, or complete facts of any one subject, were probably never developed. Life is too short, and we find too much to attend to do nothing but gather material, hence, even though we have not all the material that it may be possible to gather, we yet have sufficient facts whereby we may begin to elaborate our subject.

No movement ever countenanced by the authorities at Washington gave such a stimulus to a subject, or did so much for agriculture and maritime pursuits, as the establishment of the Weather Bureau at Washington. This bureau, established in 1870, requires all observers to take three observations daily, at the same hours, 7 A. M., 2 P. M. and 9 P. M.

By this method the changes from hour to hour, and from day to day, and the effects which are the outgrowth of these changes, are mapped, published, and permanently preserved, thus placing before us a complete "Geography of the Atmosphere."

As in other branches of physical science, the sun is the one great factor or creator of the weather. Without the sun we could not have our present form of weather prognostication, and only with the sun can we have the changes which we term weather.

The movement of the earth about the sun, the daily motion of the earth on its axis, the parallelism of the earth, which causes the changes of the seasons, alternately transferring the heat of the sun from one side of the equator to the other necessitating a change, relieving monotony. The slight oscillations of the earth, whereby its polar axis slowly describes a grand circle of some 25,000 miles in the heavens, all are caused by the sun.

To-day our northern inclination is towards the star Polaris; 12,000 years hence our earth will point toward the bright star Vega in the constellation Lyra. This movement is, however, so gradual that it has but little effect upon our weather, yet there was a time, and undoubtedly will be again, when this motion will be a factor in the changes of our weather; but that time is so remote that it does not concern the present inhabitants of the earth.

In this paper I shall speak of high and low barometer. In the whole of nature there is probably nothing more curious or difficult to understand than the curious freaks of low barometer. Before the era of the weather bureau it was impossible to understand many curious freaks of nature, which may now be readily explained by the movements of the barometer.

Every department of nature has its first cause, and it remains only for inquiring minds to learn this cause—nature has revealed to us, what is termed low barometer.

You may ask, not simply what *low barometer* is, but what causes it, and why should it possess such important properties in the realm of nature.

I think we may best understand what creates low barometer, if we imagine that where there is heat and water, there will after a while be developed suspended moisture, which we term clouds. The concentration of this suspended moisture into clouds has a two-fold effect, to preserve or retain heat over night, and to shut off during the day the heat of the sun. At times, for some reason unknown to us, the heat

of the sun by a natural tendency concentrates its rays upon such portions of the earth where there was already the most heat. As the eastern sections, or localities, are the first to receive the benefit of the sun, the tendency of which would be to heat those places, and to rarify the air, this causes the air of surrounding localities to move toward that point, and the moving air will transport the clouds to the point of greatest concentration and results in an area of low barometer or storm center. These areas of low barometer, as a rule, move toward the rising sun, and we generally have two such areas moving over the United States at a time.

Whenever or wherever this area of low barometer exists, the air is heavy with moisture, the air being displaced by the concentration of heat.

A low barometer denotes a storm, no low barometer, no storm. A high barometer, clear, or dry sky, or erroneously light air.

Water is one of the essential elements that our nature demands; we could not exist without it, nor could agriculture flourish without this wise provision of nature. The more we study the important part water plays in our meteorological economy, the more we become impressed with the importance that meteorology as a study has to the agriculturist.

Without water we have the desert, hot while the sun shines and cold when the sun sets, there being no moisture to form clouds and retain heat. Over an extended area where there is no water a low barometer cannot exist. Low is repelled and will not stop over night, hence no rain. Here then is where the meteorologist comes to the rescue of the agriculturist. The meteorologist says to the farmer, encourage water by irrigation, encourage the growth of trees, or anything that will retain moisture. Water is necessary for foliage, and foliage will attract water, thus acting and reacting upon each other.

Clouds are known to meteorologists by various names, such as "cirrus," very light clouds; "stratus," long narrow heavy clouds; "cumulus," the thunder clouds, and "nimbus," the rain cloud. Then we have the so-called "mackerel sky," the "wind sky," etc. The latter, however, have no power over the wind, they are simply moisture transported by the winds, they are subject to the wind, and the wind is governed by the area of low barometer created by the sun.

The winds are the agents of storm, the propelling power which carries the moisture from place to place, as the storm center dictates. We read that "The wind bloweth where it listeth," but it always blows toward the storm center.

When we can fully comprehend the grand and perfect system of nature, whereby our earth is watered, our temperature regulated and changed, the air renewed and purified, then, and not until then, shall we understand the beauties of nature in this department. The weather bureau will eventually prove one of the grandest inventions, acquisitions and incentives to the agriculturist, that the world ever had. Facts have been attained and utilized that, but for this system, must have been concealed for ages yet to come. In Noah's time they had crude notions and ideas about storms of wind and rain, but they could not understand the "whys and wherefores," nor the direction of storms. Even at present there is an idea prevalent that one storm may continue two or three weeks. This is erroneous, but could not have been understood years ago. One storm lasts from one to three days. But a succession of storms may last weeks and even months. During dry spells,

in summer, the storm centers are passing over the country quite as regularly as in the wet seasons of the year. But they have so little moisture in them, they fail to precipitate rain, at least in our parallel storm centers are constantly passing over the globe. Their starting point is a perpetual surprise; it cannot be foreseen, but their trend is generally toward the east. The speed at which they travel is from one to twelve hundred miles a day. The wind is always towards the center. Mountain ranges may deflect or divert the wind, but the storm center travels on. If low barometer ranges in a high line as it did the present season, it will be warm; if a low line, it will be comparatively cold. The location of the area of low barometer defies times and seasons, it is the great leveller or intensifier of heat and cold, at will, defying the apparent natural condition of summer and winter, tempering the heat of one and neutralizing the cold of the other. It is probably the most capricious, uncertain and mysterious power in nature. If one could spend his whole life in following the variable tracks of low barometer he or she could not draw lines sufficient to represent the variety of nature.

If one will comprehend the system of nature, bearing in mind that the wind is always toward low barometer, the mystery of warm weather in the northeast, while cold prevails throughout the rest of the country, is readily explained. Indian summer is likewise no mystery; low barometer explains it all—low barometer on the high line—and here is where it is rather bad on our weather prophets, for they, being unable to foretell the varieties of low barometer, show the absurdity of attempting to prognosticate the weather on unscientific lines.

Science must controvert many old notions, among them the idea that the moon, the icebergs, or planets, effect the weather. Whenever we have a high barometer it will be pleasant, and when low, it will be stormy; tornadoes or other violent conditions of the winds or rain are always found in the path of low barometer. Thunder showers always occur where there is a concentration of heat. So when we find a high low barometer, a thunder storm is in order; but who will determine beforehand which way it will travel, or the exact lines where it will rain?

On an examination of this subject, I think it will be readily seen that the only plan whereby agriculturists may be benefited by the study of the weather, is to apply to the weather bureau for a daily weather-map. Only through this system can the meteorology of our globe be explained and applied by the average agriculturist. Nature's principles ever remain the same, man comes into the world ignorant and helpless, and he accumulates knowledge by slow process. In time he is able to reason, to investigate, and if his years are prolonged to threescore and ten, yet is there scant time for the strongest mind to embrace more than a small number of nature's principles. As principles are unchanging, the most vigorous mind soonest comprehends such as are brought within its scope, and endeavors to apply them to useful purposes.

Age after age these efforts are the same, as is manifested by our scientists, where continued applications are made to secure results of long and toilsome investigation.

The aim, then, of farmers should be to avoid fruitless attempt to discover new principles in nature, for such are not, but by investigation and research to comprehend and act upon principles established from the beginning, and where by study and patience he has learned to in-

crease his crops, then freely to give that knowledge; by so doing his wealth will not be diminished, but the success of others may be created and distinction, if meekly borne, will be an abiding, honorable estimation among his fellowmen.

It must be apparent to every discerning mind, that the car of scientific agriculture is destined to pass all over our land, and that all who do not fall into it must of necessity fall under it. It will carry or crush all within its reach. There is no such thing in this world as really standing still; it is a world of progress, and all who are not moving onward are relatively moving backward. Natural history and natural science, so much neglected by the average farmer, should be carefully studied and applied. Add mind, science, to yourselves, and you will have secured the lever that moves the world. Numerically you compose about three-fourths the population of these United States. Your property pays a large proportion of the taxes, your votes elect the great majority of our lawmakers and your moral influence controls the country.

THE NEED OF IMPROVED PUBLIC HIGHWAYS.

By SAMUEL C. EASTBURN, *Langhorne, Pa.*

(Read at Langhorne Institute.)

This is a subject which I have for years called the attention of our people to, urging it from selfish and economic motives, if from no other, for it has never seemed to me to have that importance given to it which I believe it bears to the profits of farming and the values of property and farm land. In these days of telegraphic intelligence and the daily paper, you find many who can tell you about the great lines of railroad and the money invested in them, and the executive ability displayed in properly running them, but who seem to entirely ignore or overlook what still remain to be the most important ways of commerce by which the greater part of intercourse and traffic are carried on, viz: our common roads; for almost all the traffic of our railroads or waterways is first brought to them by transporting over the ordinary dirt roads, and the proportion, taking our country over, is fully 1,000 to 1 in number, yet the latter, and so much the less traveled, employs educated talent at good salaries to give particular intelligent attention to every detail of such roads, finding in that the wisest economy. How much more important is it then that we have the same means and talent employed to make our common roads, which in so many directions are used by so large a part of every community as means of intercourse and traffic.

There is not in the time allotted me a chance to speak of roadways and their development in the past, but there is not a single exception, from the time when Imperial Rome followed her conquering armies by building good roads direct from the subjected countries to her gates, but that such a course has developed and increased the value of the country through which they passed. Probably in no country in the world, with a civilization equal to our own, has as little attention been given to this subject as in the United States, but as daily we are forced, on account of competition in all business, to look up the economies of

the business, so in this matter, I venture to say there is no single subject which is of such general interest and demands our attention so strongly, as the condition of our roads, and there is no one thing which would yield so large a return for the money expended in it. When I read the various questions given farmers to answer, as to the most profitable crops to raise, I have claimed the best answers would be—even a small crop of good roads. If, as I heard stated the other day, the only way to make money farming at the present time, was to sell your farm and quit, even then my claim comes up strong, as in our community here so near the city, good roads to a place adds from 20 to 40 per cent. to its value.

Looking at it from another view, few people have any idea what the miserable roads we now have are costing, and have been costing as a tax or drain on the community, without any return in saving or comfort. I was told by a gentleman who had studied up the subject, and had made a careful estimate from available data, that Chester county since its formation had spent over \$4,000,000 on its roads. It has been estimated that counting loss of time, extra power required to haul given load, wear and tear on wagons, beasts, etc., and the taxes now assessed, that our present disgraceful roads cost us as much as the sum of our State and Federal taxation together. It seems impossible to get this matter or even a part of it, into the minds of the people, and until this is done we cannot hope for much improvement. To get them to see these things, and to feel that it is money in their pockets to change the methods of roadmaking, seems to be the difficulty; to bring the need clearly before them, as they seem largely content to churn through mud, enduring a grinding taxation for generations without knowing the burden that rests on them, or making any effort to relieve themselves of it. That we have not good roads, not as good as they might be or ought to be for the money expended on them, no one will deny, and the important question from every point of view is to see if they can't be made better. At the risk of repeating what I have previously said on this subject, I would say that this is a matter in which every land owner has a pecuniary and active interest, that it, in correcting or improving our system of ignorant mismanagement in the construction and maintenance of roads, and stopping so vast and purposeless expenditure. And I believe the more it is discussed and intelligently looked into, that you will agree with me that our present system is the most costly and the least business-like and effectual that could be devised.

It is one of those things, a heritage of the past, that there has been little or no effort to improve, and that so important a matter should not be brought up now, in keeping with the times, is not to our credit. The supervisors are not competent men, often markedly incompetent for the position; their labor is of the poorest, for which the highest price is paid; their work lacks both knowledge and method, and the results reached are the most common place and imperfect. That it has been continued so long is only because the most of you have never stopped to consider the immense aggregate cost. It is a difficult matter to get at, as it is purely a township matter, and the records as a rule are kept much as the roads are made, but having occasion to look the matter up some years back, I am safe in saying that this township of Middletown has spent over \$150,000 in roadmaking since it was organized. This is a sum at 5,000 per mile (which is above the necessary cost), would turnpike every leading road, not already in the

hands of corporations, in the township. And what have we to show for it to-day, and what will our children have to show for it fifty years hence under the same methods? If you were now enjoying the good roads which this expenditure ought to have brought you, you would not now be complaining of heavy road tax, wear and tear on teams, loss of time in hauling half-loads or less, depreciation in value of land because the road from it to the railroad was in such bad condition, of having to pay toll, which comes out of the pockets of those little able to pay, and goes into the pockets of retired local capitalists, who may loan it to you again at a good rate of interest. And those who come among you on account of your fortunate situation near the cities, to make suburban homes on our beautiful hills, would not unite as they usually do now in praising the beauties of our county generally while anathematizing our roads; and this is a matter that makes good roads peculiarly important in a pecuniary sense.

Lying as so much of our county, especially the lower end of it, so that all parts are near to railroad stations either present or prospective, I venture the assertion that if we had the roads to and from which all this expenditure ought to have made, that the land in many of our townships would increase in value more than \$20 an acre over the whole township. This would be particularly so of this township, no part of which will shortly be over one and one-half miles from one of the two leading railroads of the state. If it was but \$10 an acre, what an addition to the general wealth of the township.

I do not know whether it was intended that I should go further than strongly call your attention to the "need of improved roads," but it would seem hardly fair to so strongly insist on defects of present methods without suggesting or proposing a remedy for them. My idea is that the care of roads for each township should be put in the hands of five public-spirited, not political-spirited, men of the township, who might have the title of trustees, and be elected at the regular elections. These men to employ a competent engineer at such a salary as would secure a good man, buy him horses and carts if necessary, good tools, a stone crusher, a road scraper, in short, the entire outfit necessary for his work. Put on him the proper care of all these things, the same as any superintendent would have. Let them give him at the start their general ideas as to certain roads or parts of roads, and at monthly meetings thereafter further special instructions, if necessary. At these meetings let him report to them the probable cost of removing hills, establishing proper grades, or turnpiking those that it had been concluded to do as previous meetings. The matter of widening or straightening roads, or such obstacles as might arise, could be brought to their attention at these meetings. These trustees could and would serve without salary, as their duties would not be hard if they secured the right man. By this method they would know what it was costing monthly, how much more they proposed to do would cost, and that they were getting something permanently and well done for their money expended.

But some one says, "How would you pay for all this, and it would cost too much." My idea would be that the county or township should issue bonds for that special purpose to an amount based upon an appraised value of its property, real, personal and corporate. Taxing this township two dollars and fifty cents an acre would raise nearly \$40,000. These bonds would be secure enough to sell readily and at a low rate of interest, many being taken locally. They would

be safer, and in the increased value of all property adjoining pay a larger interest than western mortgages, which have taken so many thousands of dollars out of the county, and whose only merit as an investment is their distance, and the big commissions made by agents. If the money put in them by our people south of Doylestown for three years past had been intelligently expended on the roads in the same district, I have no doubt every road could have been macadamized and real estate values increased from ten to forty per cent. After taking out of the sum received from sale of these bonds sufficient to pay salary and secure equipment, there would be some \$35,000 immediately available. This sum spent on the leading roads would Telford or McAdam the most of them, and this could be done in two years after it was begun. After that was well done a man and wheelbarrow ten days on each mile of road at the proper times could keep it in good order. Of course I have to take a township like my own, and with which I am familiar, as an illustration. The interest on \$35,000 at four per cent. is \$1,440. Our present yearly expenditure is nearly four times that amount. This bonding the land would take no outlay in money and save tax, unless you chose to continue the present tax rate, when the bonds could be paid off in twenty years without figuring on an increase in the value of property, which is sure to follow. Under this plan you would have good roads from the start, with all the economies and comforts that follow. But it is not necessary to keep the tax rate where it is now and pay off the bonds so early. They would sell at as low and probably lower rate of interest if they run forty years, and in a permanent improvement like this, from which future generations derive profit, they should at least pay their part of a thing so well begun.

I am well aware that there is a feeling against borrowing money, but there are many times when it is prudent to borrow. If it were not so our best business men would not need and so largely use this method to improve and extend their business. Borrowing money to construct roads must commend itself to all thoughtful persons as a perfectly legitimate, a wise and prudent measure, because it will be universally admitted that good roads will surely add to the value of neighborhood property, and the securing of this capital means the power to build them. It also means a quick completion of them, so we can immediately begin to reap the good results. It is true that borrowing the money means that it is requiring an interest which must be paid, but it is with an equal certainty early stopping a waste of money we are yearly making more than three times as large as the interest. It means a relief to taxpayers, or if you do not wish to admit that, then say it makes an investment and a good one of what you do pay, at once yielding a daily and annual profit, while what you are taxed now is practically given and is not returned to you or your children or your estate, this year, any year, or ever. It means comfort and pleasure in our daily rides for a less amount expended than we often spend for a week, only of less real comfort and pleasure.

To our beasts of burden it allows us to be that merciful man to whom the good book has promised he may expect mercy. It surely means an increased estate. For how many purposes less important than the least of these do we daily borrow money, and if we add these many other reasons together, what is there that we do borrow of the future for that equals in all human probability and experience so sure a return?

These figures will apply more or less correctly to all townships. Of course size, number of roads, roadmaking material and other circumstances will modify the plan for certain localities, but I am sure this can be done in the general way indicated and with good results. Much might be done by cutting down sharp hills and using the material of which they are made—generally stone—in some other part. A portable steam crusher would also find much material from the farms along the roads that in the dull season could be made into road material. There would be found many rough pieces of land near the roads it would pay to clear for the material, if the owners had not sufficient public spirit to do it. I could continue on most indefinitely urging reasons for better roads or suggesting improvement in them and showing clearly profit and progress, but I have sufficiently indicated my trend of thought on this matter.

Now what would we gain by all this? First, good roads and at once and always and everywhere. Second, less wear and tear on carriages, wagons, men or teams; less expensive teams to do a like amount of hauling; less cuss words; more comfort; a higher self-respect and pride in our neighborhood and surroundings; higher prices for the land bordering on such roads, and all at not one-half the yearly expense we are now put to, for which we get practically nothing except further expense. It would be too much to expect these ideas to meet the views of all, or however correct, to have them at once adopted, but I do ask in your own interest their careful consideration.

WHAT SHALL WE DO WITH OUR MILK?

By C. S. BALDERSTON, *Solebury, Bucks County, Pa.*

(Read at Doylestown Institute.)

To lay down any prescribed rule by which every one engaged in the dairy business could be guided would be impossible. The nature of surrounding circumstances which so largely affect the methods of every individual must decide the matter in which he disposes of his milk. The enormous proportions that the dairy business has attained make it necessary that established rules of trade be adopted for marketing the product. One of the great fundamental principles upon which the success of all business transactions of this kind is based, is to bring producer and consumer as near together as possible, thus saving the expense and risk incurred by allowing the goods to pass through the hands of intervening merchants and middlemen.

The man who comes the nearest to this perfect method of economical business management is, perhaps, the suburban city farmer, who can take his milk fresh from the cow every morning and deliver it to customers in the city himself, receiving the full retail price as a compensation for his labor, and commanding his choice of customers on account of the freshness of his goods.

The careful, painstaking farmer, who makes a superior article of butter and takes it to market himself along with other products of the farm, retailing it to friends and customers, also receives the full value for his labor.

But the great army of milk producers who constitute the backbone of our agricultural population must seek some other method of selling their goods. Every farmer cannot live near a city, and few possess the knowledge and skill required to make a really first-class article of butter.

The problem of domestic labor enters so largely into the business of home dairies that the class that can enjoy the advantages of this system must necessarily be small. The shipping of milk to city dealers to be retailed to private families has engaged the attention of many dairymen and in spite of the many discouragements attending the business it has grown to great proportions where railroad communication is available.

The objectionable feature of this method of disposing of the milk consists in the early hours which the farmer is forced to add to his already long day's work. He must provide about three times as many cans as will hold his milk and likely lose about one set of cans a year; he is often compelled to ship his milk to irresponsible parties, trusting entirely to their honesty and frequently lose a month's pay for milk on which he had to pay freight in advance, and he is compelled to accept the price for his milk that the milk dealers' organization sees fit to vote that he shall receive.

Various organizations have been formed from time to time which have but partially succeeded in removing these difficulties, and many farmers have abandoned the business and are taking their milk to the creameries. The creameries and cheese factories of the country are a godsend to the farmer. They can be built in any locality and they take his milk and make it into butter and cheese, placing it on the market in the shape of a manufactured article. Since the great bulk of the milk is handled in this way, the best manner of disposing of these products is what concerns the farmer most. How then can he get the most money for his butter and cheese? In answer to this question I would say, that since they must be sold on the open market, the quality of the goods will go a long way toward selling them. Farmers are disposed to think that after the milk reaches the creamery they are done with it, and it matters little to them since their milk is pooled with that of the neighborhood whether it goes in good condition or not. No creamery man can make good butter from a number of poor lots of milk any more than he can from one poor lot, and it is of the utmost importance that every man's milk be of the best quality possible. An extra quality of butter will always command a higher price than an inferior quality, and a reputation once gained always insures a ready sale for the goods.

Regarding the manner in which the goods are sold I would say that they are sold very much the same as other farm products are sold, the buyer fixing the price and the producers taking what he can get. Farmers might combine and restrict production like men in other branches of business, but that would be forming a trust and farmers are not supposed to do such ungracious things.

It has been found profitable in some localities to establish a board of trade where the goods could be taken and sold to the highest bidder, but it is doubtful if that would pay here. The creameries that are selling their butter at the door and getting the highest wholesale price or a little more, are doing well, and if prices are low it is because the supply is greater than the demand.

I know that there is a disposition on the part of some people to

think that the prices received at home and that paid by the consumer are too wide apart, but they are people who have had little experience in attending market and a few trips mostly causes them to change their minds.

I do not find that creamery men who market their own butter do any better with it than those who sell it in the usual way. The prospects are that dairy products will continue to be sold very much in the same manner that they are at the present time.

THE BRIGHT SIDE OF FARM LIFE IN BUCKS AND MONTGOMERY COUNTIES.

By JONATHAN LUKENS, *Horsham, Pa.*

(Read at Doylestown Institute.)

A quotation from "The Merchant of Venice" says, "So doth the greater glory dim the less. A substitute shines brightly as a ring until a ring be by." Therefore I do not propose to compare the condition of the average farmer of Bucks and Montgomery counties with the possible glory and luxury enjoyed by the Vanderbilt's, Astor's and Gould's, though I really fancy the former enjoys as much solid peace and pleasure as the latter.

Assuming as I do that there is a bright side to farm life in our sister counties, it now becomes my duty to give my reasons for the position I have taken that they may collectively add to the bright and right side, though the first named is slightly older than the latter (102 years) it would seem entirely fitting that the younger should look up to her older sister for advice and assistance in the time of adversity or that of prosperity. So after Bucks county set the example by organizing a farmers' club, and Montgomery, like a dutiful sister, after due deliberation, follows suit by forming the Horsham Farmers' Club, and now we find them joining hands and standing side by side for the common cause, Bucks county now having two live farmers' clubs, and Montgomery countians are already discussing the feasibility of forming a second one. Now the very fact of these various active clubs being formed shows that there is more interest taken in the cause than was formerly the case, out of whose works we will no doubt derive beneficial results.

We must all admit that the bright side has not for several years shone forth with so brilliant a light as would have been desirable to most of us; neither has the merchants, mechanics and members of the various professions been always favored with smooth waters and paths strewn with flowers.

When the alarm was sounded from the east, and south, and west that clouds were gathering which seemed to some to threaten to obscure the agricultural sun from view, and finally to settle directly over our grand old counties, then we found work for our clubs to do—real, active, practical work, both for the organizations and for each member individually. The time had come, the time has undeniably arrived, for earnest and true work, and we can only expect good results by each one doing their share of the task before us to reburnish the right

side of farm life, and right here I cannot do better than to quote George Sand, who says: "Work is not man's punishment; it is his reward and his strength, his glory and his pleasure." So in that fact we have one bright star.

In order to renew our strength and prescribe the proper remedy we must inquire into the cause of this turmoil and general confusion and its nature—whether its life is nearly exhausted, or whether it is a young and growing creature yet in its infancy and daily gaining strength. So in order to get at the question rightly, we must take a sort of bird's-eye view of the United States; nay, even of the whole world.

First we find that all history will bear us out in the assertion that farming is a thoroughly legitimate occupation and will remain so for all time to come, thus giving us another bright light. We find by history and statistics that but three per cent. of the population of the United States lived in cities in 1790, which percentage has been increasing ever since that time. In 1880 it reached twenty-two per cent., and now the cities apparently have about thirty-three per cent. of the population of the United States besides the numerous towns, boroughs and villages. Hence we find another bright star in the fact that the rural and city populations are steadily changing in relation to each other, so that with the aid of judicious legislation it would seem very clear that the law of supply and demand is now about to shed its great and all-powerful light on our occupation; for while we here have for the past twenty-five years witnessed the rapid development of western farms and their products brought to our eastern markets—more than keeping pace with the increase in population, we are now satisfied that while the population will continue to rapidly increase the acreage for farming purposes will not increase in anything like the same proportions that it has for the past two or three decades. While it is a good thing to have a foreign market for our surplus farm products as well as the products of our factories, it is the home market that is desirable for our agricultural productions, as the output of the factories and shops can be transported at a much less percentage of their value than is the case with the farm productions; after viewing the situation with an impartial eye we find the resources of power available for manufacturing purposes practically unlimited and in a form which can be so economically applied that no other nation can wrest our manufacturing interests from us and we will be able to compete in the markets of the world with our manufactured goods.

In an article in the *Philadelphia Ledger* of the sixth instant, we are told that the Baldwin Locomotive Works, after entering into competition with the great locomotive works of the world, captured the contract to furnish locomotives for New South Wales, Australia, thus proving that Bucks and Montgomery counties have the workshops of the world at their doors, another bright star, which should kindle new enthusiasm within the breasts of every citizen of our counties. Little did Mathias W. Baldwin think, when, in 1832, he built the first American steam locomotive, and said to one of his employes "this is our first and our last locomotive," that the same man would be in his employ when he put number five thousand on a locomotive, but such was the case. Little did he then dream that the workshops bearing his name, would, in 1890, be turning out three complete locomotives per day, and, in open competition with the world, get the contract from countries that were formerly supplied by England.

We will now take a closer view of our homes, which reveals the fact that the two counties have over thirty miles of border on Philadelphia, thus showing at a glance that quite a considerable area is in close proximity to the city of homes and factories, with its population of more than one million persons to be fed, and while the more remote portions of our counties are not so easily accessible to the markets, they both have considerable and increasing railroad facilities as well as water ways for reaching the markets. As in Montgomery county there is probably no farm more than seven or eight miles from one or more railroads, while in some parts of Bucks county the distance is somewhat greater. Still it is only a question of a few hours time and attendant expense to reach from any part of our counties the two largest and best markets in the eastern part of the United States, wherein we find the bright and ever-shining light which brings gladness to the farmer's heart.

In the year just closed we find Philadelphia has built enough of new dwellings for the accommodation of at least 50,000 persons.

The ocean's tide is lowest just before it begins to rise, the days are shortest just before they begin to lengthen; upon taking a careful view of the situation we may safely conclude that the low tide with the farmers of our counties was reached in the years 1888 to 1890, and that with the advent of the year 1891 we find the tide slowly but surely and steadily rising. The passage of the Reading Terminal and Belt Line bills, together with other great improvement proposed for the current year, will add new strength and vigor to trade in the city which will soon be felt in our counties, and every true farmer in Bucks and Montgomery counties will be rewarded for his labor so long as the historic Delaware flows on the east and the beautiful Schuylkill on the west.

Lander says: "Those who are quite satisfied sit still and do nothing; those who are not quite satisfied are the sole benefactors of the world." If that be true we as a class must surely be in a possession to work grand results in the world. While it is perfectly right that we should organize and work and think to promote the best interests of our calling, we must not elevate ourselves by pulling down other thoroughly legitimate industries.

In order the better to see the bright side we must study our business and its possibilities—first our soil, both as a whole and by divisions, and what crops it is best adapted to growing and which crops can be most profitably grown, and marketed from your particular farm, not for one year alone but for a series of years. Consider your facilities for labor. Study what style of farming is best suited to your family, a wide-awake farmer and his family will find pleasure in discussing these details in relation to their own particular farm, for it is absurd to follow in the footsteps of another simply because he has been successful in that line, without stopping to consider what our conditions are in relation to that kind of work. For instance, it may be profitable for one farmer to keep a butter dairy, while for his neighbor that branch of business would only be a sinking business, wing to different conditions.

T. B. Terry, of Ohio, tells us that he makes farming profitable on a fifty-acre farm without either pigs, chickens or dairy, except one cow to furnish milk and cream for family use, yet they use butter, eggs, poultry, etc., which must be produced by some other farmer who is differently situated and can profitably raise them for the market, and so we will find it in our counties.

Having selected our standard crops and their suitable accompaniments next comes the question of marketing with the view of obtaining the best net results, and here again we find a broad field for labor and for pleasure if we choose, for do we not frequently see the unthinking person spend two dollars worth in labor to get one dollar more in gross receipts; therefore we should study our local markets, of which class there are very many and important ones in our counties and near them, and find out what they want and what we can supply them with to advantage, and so by selling to the consumer when practicable you reap your reward in dollars and the pleasure of being brought into the intimate association with the consumer of your products.

And when our smaller local markets have been fully supplied from our farms we find the great market of Philadelphia right at our door ready to take every cent's worth of our surplus products and if not now in all cases at an appreciable profit, the time is certainly not far distant when they will all be wanted at a price that may be made to pay the producer, but in this day of sharp competition it will be useless to think of sending to market articles below the standard grade of excellence. In this very fact we find a bright and ever-shining light, as per force of necessity we are spurred onward with the attendant result of elevating our profession to a higher plane, where science and philosophy will become our aids, and where more skilled labor will be demanded and supplied; for when we consider the increase of city population at the expense of the rural districts, both in the United States and in Europe, it would seem but a natural result that there will soon be at least a slight reaction in that direction, and that farm life will become more popular, both in-doors and out. I will venture the assertion that there is no spot in our nation's domain where this result will be sooner felt than within the bounds of our own counties.

Neither let us forget amidst all the rush for the dollars that it is not always the one who has the largest bank account to his credit that has contributed the most to the sum total of happiness in the world. Webster has said, "One may live as a conqueror, a king or a magistrate, but he must die as a man."

Now let us for a moment compare our condition with that of some parts of the much lauded west, and we find thousands of families in utter desitution in a land where they had gone with the expectation of reaping a rich reward of gold, and their hope of relief is with the government or individual friends. While it is perfectly right to emigrate to the west for in some cases to leave our farms here for city life, let such moves be made only with caution and forethought, as the writer well remembers the case of an intimate acquaintance who left a good business in the east and took up lands in the west with the hope of growing rich, with the result that in about two years he was again in the east looking for employment, having lost several members of his family by death, and, to use his own words, they did not raise enough from their farm in a year to keep them two months.

Also let us recount our social advantages of a comparatively thickly-settled farming district; the easy access to churches and libraries, stores and postoffices and schools, both private and public, in all of which our counties abound, and which is always an index to progressive society. We should also remember the value of being located near our relatives and friends, and as our counties were settled by William Penn's early followers, two hundred years ago, our present population is largely made up of their lineal descendants, which has formed ties

of friendship not to be broken up by light and trivial causes. And have we not additional reasons to be of good cheer when we contemplate the choice of location made by William Penn and his associates, and that our homes are so near the birthplace of liberty of the American colonies?

I must now recognize another source of never-ending pleasure and inspiration—that to be derived from our communion with nature's works while pursuing our daily occupation and most especially in this locality by the opportunities we have of enjoying the varied landscape views, places us in a position that might well be envied by a king; and while even working at home on the farm, to the wide-awake person there is always something new to invite investigation. Then, again, the drive to market, whether it be to the nearest village or to the city, adds its mite to the bright side of the farmer's life, and should be a source of healthful recreation and pleasure to every member of his family occasionally, as every member of a practical farmer's family of our counties who misses the opportunity of driving to market with a team such as only goes to Philadelphia market from Bucks and Montgomery counties, most certainly loses a very important part of their education, in fact it is a part of their education, which, if assisted by suitable instructors, will go a great way towards rounding up the character and laying the foundation for good citizens. The writer, though traversing the same road hundreds of times in going to and from the city, can always see new beauty in the landscape view, which is ever changing by a new building springing up in one place and an old one demolished in another, a tree planted here and one cut down in another place, thus opening a view of some distant hill or valley not before seen.

It is said that there is a superstition among some savage nations that he who wrestles with and kills a wild animal receives its strength into his own body, and so it is with the farmer that meets and successfully overcomes the obstacles in his chosen path will be rewarded by new strength for other conquests.

PAYING FOR MILK ACCORDING TO ITS QUALITY.

By HENRY W. GROSS, Doylestown township, Penna.

(Read at Doylestown Institute.)

Picking up a Doylestown daily in a lawyer's office one evening a few weeks ago, I noticed that I was appointed to say something before a body of creamerymen at some indefinite future time, upon the subject of paying for milk at creameries according to quality. That same evening I formulated some questions which I forwarded to creameries where some such plan had been adopted.

Resolved, That creameries should pay for milk according to quality, according to the amount of butter fat in it.

This is not a thread-bare, worn-out resolution that has been discussed every winter for years past at all country debating societies, but it is a new, live practical subject. A subject that concerns every honest dairyman that furnishes milk to a creamery. Neighboring

farmers shipping milk to Philadelphia have for years and are to-day all receiving about the same per quart for milk regardless of the amount of butter fat in it. Probably it is this custom, in part, that caused our first creameries in eastern Pennsylvania to pay for milk upon the same basis. And to-day that plan has but few exceptions with us, outside of an occasional reduction or fine, or both, for furnishing tampered milk.

Hence there naturally has arisen among farmers a desire to get dairies that give pounds of milk regardless of pounds of butter; a desire to sell poor milkers, though extra good butter cows, and to buy instead big milkers—"big baggers"—seemingly losing sight of the fact that the bulk of the money to pay for milk must come from the amount of butter sold and not from the amount of skim milk or skim cheese sold.

I have heard farmers say, "The milk from this cow too good to send to the creamery; we keep her milk at home and make butter." If milk were paid for according to quality would not the milk from the Alderney cow also get to the creamery and pass through the separator? But is it advisable or even desirable so to pay? Notice the questions sent out to quality-paying creameries:

1. Is there any opposition to your mode of paying?
2. Is it any more just or equitable?
3. How often do you test each dairy?
4. How long does it take to test all your dairies?
5. Does the same dairy test the same six consecutive days; and if not, why not?
6. Did it increase your yield, and how much?
7. Do the churn's yield and the test agree?
8. Do you rely wholly upon the butter test?

Now notice some of the answers:

"I think it is the only fair method, as each man gets his dues."

"I do not think our patrons would be satisfied or willing to abandon the butter test."

"We use the butter test only."

"For twenty-eight patrons it takes two and a half hours."

"Our present plan for paying out did not increase our yield worth speaking of."

"Our lowest dairy for the month was an average of (3.6) three and six-tenth pounds butter fat to one hundred pounds milk. A small dairy of Alderneys average about five pounds."

Another one replies thus:

"It is more accurate and just".

"Sixty (60) test in (3) three hours."

"We use the butter test alone."

"The lactometer test and cream test are things of the past with us. In a little time after adopting the new plan our yield increased one-fourth pounds of butter to one hundred pounds of milk."

"The same dairy very rarely tests the same six (6) consecutive days. It is hard to account for this at all times. A change in the weather has a great deal to do with it, so also careless milking, not getting the strippings; abuse of the cow while milking is another cause. Irregular time for milking, for feeding, change of feed, exposure and failing to drink one day and drinking to excess the next are all things to be avoided when uniformity of test is desired."

Some of the answers from a third party are these:

"Under our present system each dairy is paid what it earns."

"We have gained under our present test system from one-half to three-quarter pounds of butter to one hundred pounds of milk. And our patrons take home for their family use more than three times as much butter now as they did before we adopted this system of paying, though they no doubt used as much butter before."

"The rivalry now is to make or have the most butter; it used to be to furnish the most milk."

Now as to the system being practical, advisable or even desirable, I think the experience of those quoted answers that without a doubt. Two of those creameries have in the flush of the season from 15,000 to 20,000 pounds of milk daily. Surely if those mammoth creameries make it a success then the average size creameries should have no difficulty in carrying out the plan. Why, then, do we not pay upon the quality basis? Why did we not do it long ago?

On the morning of July 3, 1879, eleven and a half years ago, the first creamery erected in Bucks county commenced taking in milk.

It was something new; people opened their eyes and looked on with astonishment; talked about it on the street corners of Quakertown, at the blacksmith shop and the country store. Many knowing ones shook their heads and prophesied a very short existence to such an enterprise, in proof of which they recalled some "Wild-cat scheme" that soon fizzled out and so would the creamery. But by and by a second company was organized, a building built and a creamery started. Then a third, etc., until now the creamery business has spread over the entire length and breadth of this land—from beyond the great lakes to the Gulf and from the Atlantic to the Pacific so that, as stated yesterday, it has assumed immense proportions and cotton is king no longer. And does not common sense teach us that to be fair and just to all we should treat this immense industry the same as every other business, buy as well as sell according to quality?

In its beginning we were untutored, unlearned in creamery affairs; and while it may have been a mistake that we ever commenced paying for milk regardless of quality, it may be well to remember that creamery work was new to us, we had much to learn and many of us paid very dear for our creamery education, but this vast industry had to have a beginning here even though thousands of dollars were lost and misapplied for the want of experience, knowledge and needed apparatus.

Inventors have had their eyes and brains active and appear to have anticipated some of our needs, giving us various new devices and appliances for improving and systematizing the business, and now we have instantaneous and continuous cream separation by centrifugal force, capped by butter, fattest machines upon the same principles, besides other devices aided by chemicals, thus giving us the commercial value of every dairy—the real value of the milk brought to the creamery, whether skimmed, watered, salted or soured.

Having the knowledge and the appliances why not follow right up and take hold of a system that is on the way and sure to come—paying for milk according to quality?

While we eastern people were suspiciously looking on our western competitors took hold of centrifugal cream separation and made money a year before we were ready to venture here.

To-day our western people are adopting the butter-fat system for testing milk by the dozen, a Philadelphia manufacturer having an order from a Chicago firm for six hundred (600) test machines, and

we stand here debating the question and continue paying full and the same price for thin milk, skimmed milk and watered milk.

Many an honest farmer gets discouraged, knowing that some of his dishonest neighbors get a benefit from his well-fed and well-cared for dairy. And what does he do but reduce his dairy and take but little interest in dairying, as it is a losing game for him. If, on the contrary, he were paid according to quality, he would receive five, ten, fifteen and even twenty cents more per one hundred pounds of milk than his dishonest neighbor, and that means a paying price for milk, a larger dairy, an increased supply of milk at a creamery and honest effort properly rewarded.

Mr. Balderston says, "The creamery and the cheese factories of the country are a godsend to the farmer." But I have often thought and said that the creameries instead of being a blessing appear to be a curse to many of our farming people.

The business is the cause of more falsehoods; yes, I know I voice the sentiment of a large majority of our creamery managers when I say it is the father of more prevarications and dishonest practices by some of its patrons than any other business. If I had time I would like to enumerate about one hundred of the mean, paltry, little excuses made and given by a certain class of milk producers when their attention is called to the leanness of their dairy product. But some of you already know and every creamery manager knows what they are, such as, "Well, I do not feed much." Another thinks he feeds too much, as he has heard it said that very rich milk does not test as well with the lactometer as milk of a poor quality. One has changed his feed or intends to change that day, and next morning he wants his milk tested again; thinks it is all right now, and frequently there is a big improvement.

Some get excited and use many loud and strong epithets, while others get "on their ear" and are ever and always ready to haul their milk to some neighboring creamery if the milk is not satisfactory here.

It was always right before and never had any fault found while living in an adjoining township and hauling to Mr. Smith's creamery. The operator always pronounced his milk about the best he had.

I at one time wrote a note to neighbor manager, inquiring "How did Mr. Jones' milk test at your factory?" The answer came back: "I always though he rinsed his buckets well." Another one said: "Ugh! he never did bring his milk straight."

Some patrons suddenly find out that the dog or the cat had access to the milk and probably took off the cream; or that the hired help had been taking of the cream and adding water to make up the usual weight, and even the wife, as a last resort, is accused of tampering with the milk. Probably the lids were off and during the night it rained; or the spring house was flooded and the cans dipped water; or the can stood in the water barrel under the spout; the cows were out in the rain all day; or they had more salt than usual and drank too much water; one of the cows had been suspected for some time of giving poor milk and now the poor old cow must be sold. There is scarcely a man but what brings the milk just as it comes from the cow, and of course if the milk is not satisfactory he does not know what to do—he cannot bring it any better.

Some of you who are present to-day, not conversant with the facts and the tricks probably think the picture overdrawn, but if you remember that a secretary of a Chester county creamery, the county

where we would fain believe none but honest people lived; writes of his one hundred and twenty-five milk producers: "Our patrons take home for their family use more than three times as much butter now than they did before we adopted this system of paying, though they no doubt used as much butter before." If you remember that and take it for truth, which I know it is, then you will not blame me for any exaggeration.

I tell you it is a "burning shame," it is a disgrace, that the morals of so many of our people, the morals of a certain class of farmers do not rise any higher, yea, is it not about time that we change our tactics and try to remove some of those temptations, instead of aiding to lower human depravity? Yesterday the oleomargarine traffic was branded as the biggest fraud in the United States, but let me tell you the honest dairyman considers paying the same price for milk, regardless of quality, also a big fraud.

Why not pay for milk according to quality and throw out inducements to be truthful and honest? It certainly would avoid much of the contention and differences that now occur at the creameries and aid to improve the morals of some of our people. It is a fair, just and accurate business-like way of doing business.

SILOS AND ENSILAGE.

By B. C. MITCHELL, *Brandamore, Pa.*

(Read at Bath Institute.)

It is not a treatise of natural history that I have written, but simply the results of my observations and experiences. In stating these results I use the language of daily life, believing that thereby I shall be better understood by those to whom I address myself, and who, like myself, are not familiar with the technicalities of science.

In 1886, I built a silo or rather two silos under one roof, the size of them being 14 feet wide, 32 feet long and 22 feet high; the walls are constructed of stones laid in mortar, and are two feet thick and cemented on the inside with Portland cement.

Stone silos require to be well cemented to keep ensilage well, as it is very important to keep the ensilage well protected from the air, frost and water. I think it is well that the silos should be built as a separate structure, but adjoining and as convenient as possible to the feeding stable. If the silo is built on dry soil much labor may be saved, as well as expense in building expensive foundation and drainage. Much has been said and written upon the various modes of constructing silos. Some advocate wooden silos as being far cheaper and better for keeping ensilage in than stone ones, but as I have had no experience with anything but stone, I cannot speak with any practical knowledge upon the wooden silo, suffice it to say that the stone silo will do me. I think them almost indispensable in the way of economical farming. (But I wish to say right here that a farmer never need to expect anything better to come out of a silo than he puts into it.) I would not attempt to farm without silos after having five years' experience in farming with them. The idea of a silo is to intensify

farming and, reduced to practice, is to raise the largest amount of the best material with the least possible amount of labor consistent with good culture.

It is a great source of economy because you can keep, I can safely say, three times the number, and some say four times the number, of stock upon the same amount of ground that you can in the old dry fodder way of feeding stock; for instance, I can raise ten tons of green corn ensilage upon an acre of ground that will raise but one ton of hay; or, in other words, I can raise twenty tons of green corn ensilage upon the ground that it would take to yield two tons of dry hay, and two tons and a half of ensilage will go as far in feeding stock as one ton of dry hay, and will keep the stock a great deal better. With dry food nature is heavily taxed at all points to make good the lack of the natural juices of the plant; the woody fiber of the plant must be broken down and disintegrated by the power of the gastric juice in the stomach in order to set free the nutriment contained in the plant. The force thus required is several times greater than when succulent food is fed. I have had considerable experience in feeding stock with green corn ensilage; therefore, what I say upon the subject is from a practical knowledge and not from hearsay or what I may have read from books. One year ago this winter I fed about 140 head of stock all told, of various kinds, and this winter I am feeding about seventy-five head, all told, consisting of twenty head of horse kind, such as work horses, driving horses, brood mares, colts, ponies and mules, and fifty-five head of cows, the most of which are giving milk. I have never fed anything to stock of any kind that was more satisfactory than green corn ensilage. It is said by good authority that ensilage is good and economical for feeding sheep, hogs and even poultry, but I have never had any experience in that line, consequently I cannot vouch for it, but I believe it is good. My horses have done splendidly on it, and for feeding dairy cows I think there is nothing that equals green corn ensilage. Cows fed upon green corn ensilage will give more milk and of a better flavor and quality than any other feed that you can give them, but I would not recommend feeding ensilage alone. I think cows need a mixed feed.

As to the chemical action of ensilage in the silo, when the corn is cut in the field and put into the silo it at once begins to heat. A certain amount of this cannot be avoided, and experience has shown also that a certain amount of it is desirable, both to kill the bacteria, which causes the heating, and also to properly cook or prepare the ensilage and thus assist digestion. If this fermentation does not take place in the silo it must in the stomach. All sugar or starchy matter contained in food and taken into man's stomach must undergo a fermenting action in the stomach before it can be digested. This also holds good with the brute family, and before the sugar and starch passes successively through the several stomachs of the cow this action must take place to produce a perfect digestion, so that with ensilage this moderate fermentation and preparation of the food in the silo assists very materially the digestion of the animal, enabling the cow better to assimilate her food and to produce more largely of milk and fat. To this and the excellent laxative effect of ensilage upon the bowels in part may be attributed a large share of the benefit cattle universally derive under the system of ensilage feeding.

Now as to the *modus operandi* of getting the ensilage. As I have no experience with anything but corn I cannot speak intelligently upon

making ensilage of any other material. As to the kind of corn it seems to be a matter of controversy, as the wide range of the silo carries it into localities out of the corn belt where seasons are short and conditions not always favorable to the best corn growth. For each locality a particular kind is pointed out. My experience is that here is nothing that equals the big southern white corn for this section; it will keep green longer and contains less woody fiber. It would be useless for me to say to an intelligent class of farmers that it requires good, well-manured and well-tilled soil. Plant as early as the time and season will permit of: drill in rows not less than three feet six inches apart, using from eight to twelve quarts of corn per acre; as soon as the corn is up, or even before it is up, harrow the ground well with a smothering or slanting-tooth harrow. I have had good success in harrowing corn with a twin spike-tooth harrow.

The best time to cut corn for good ensilage is when it gets to be full roasting ears, and if the corn begins to glaze it does not hurt it. The way that I cut and haul corn to the silo, after trying many ways, is, I cut and lay in gables as large as a man can easily lift up on a wagon, or rather, it takes two men to hand it up to the loader. We generally haul with three teams, but that is owing to the distance we have to haul. We run our cutter with an engine; we cut it in one-half inch lengths and run it into the silo with carrier attached to the cutter, and we can cut a ton in from eight to ten minutes. There are various opinions as to the best plan of covering and weighing ensilage. I have tried tramping, covering and weighing, and have finally concluded the best and cheapest way is to put it in loosely, simply leveling it down and covering it about two feet deep with chaff, straw, swamp grass, or cut cornfodder, and in about twenty days the ensilage will be ready for feeding.

CORN AND ITS CULTURE.

By CASPER HILLER, *Conestoga, Penna.*

I need not give you the history of corn—tell you of the millions of bushels raised every year, and of the many uses to which it is applied. With all this every reader is familiar. The interesting question is how to produce it cheaply and plentifully. Necessarily cheaply, because cheap freight from the west has made cheap corn. The average price of western corn at our railroad stations has been of late about forty-three cents a bushel. On this the western producer had to pay the freight, and therefore realized only a few cents a bushel.

We, having a home market, have the forty-three cents net. Freight discrimination does not affect us here. In Conestoga township we raise 50,000 bushels of corn, more or less, which we use at home, and in addition we bought about 15,000 bushels of western corn.

Why do we buy thirty per cent. of the corn we use?

Can we not raise it for forty-three cents a bushel, or have we reached the limit of production?

It is said the average crop of our county is under fifty bushels per acre. The margin of profit on a fifty-bushel crop won't make the grower rich very fast. But why raise only fifty bushels? How much

should we raise. In theory, 150 bushels to the acre. Hills three feet by three feet with two stalks to the hill make 9,600 stalks; 9,600 ears with a pint of corn to each ear make 150 bushels. It looks very easy on paper. In practice, from 80 to 120 bushels are often obtained.

In studying the possibilities of corn, I last year had under special observation three tracts.

One produced eighty bushels. This was grown on a plot of naturally poor soil, which was farmed for several rotations in corn, rye and clover, and was fertilized in all that time only with phosphoric acid. The peculiarity of this crop was that it had less than a stalk to the square yard, having by count only 4,400 plants to the acre, showing that on an average each plant had a pint of corn.

The second tract made 118 bushels. This was on fairly good land, with a good clover sod, and was fertilized with five hundred weight of South Carolina rock; was planted three feet four inches by three feet. At two stalks to a hill it would have had 8,700 stalks to an acre, but, from failures to grow, had only 7,500. This, too, made a pint of corn to each plant.

The third tract was good land, and was manured with five hundred weight of a complete fertilizer, four hundred weight at the time of plowing and one hundred weight scattered between the rows in July, before the last cultivation; drills three feet four inches apart, and the plants seventeen inches apart in the rows, making 9,000 plants to the acre, yielding 123 bushels. This did not make a pint of corn to each stalk. Part of this tract was flat where the excessive wet of last season was perceptibly injurious. On this ground the plants made excessive growth, many of them measuring fourteen feet, with ears eight feet up. The rows ran east and west, which shaded the ground injuriously. Rows on such rich land should be north and south. Corn wants sunshine and rain.

The principal elements to success in corn culture consist of manure, good plowing, good seed and good cultivation. Manure is the principal element to success. For want of it I have, in my younger days, raised fifteen bushels of corn on an acre, and I think I was not the only one that did it. It is a good thing to have plenty of stable manure on hand, and to the farmer who has enough of it, little need be said—he will know what to do with it.

With our present facilities of manuring we must not spend too much money in building up the manure pile, and we should not spend a dollar in buying stable manure. Stable manure is not a well-balanced corn manure. It has too little phosphoric acid in proportion to potash and ammonia. A corn fertilizer should have about fifty pounds of phosphoric acid to an acre dressing, and to get this in stable manure you have to apply at least ten tons of stable manure per acre. In these ten tons you apply eighty pounds of ammonia over the wants of the corn, which at its commercial value represents a loss of \$12.

Three or four tons of stable manure and two hundred weight of South Carolina rock make a good corn fertilizer. But on most of the soils of lower Lancaster county, ammonia and potash are present in sufficient quantities for a corn crop, and they appear to be exhausting very slowly, as I know from experience and observation. For example, I know land in Martic township, where the original Scotch-Irish settlers farmed all the plant life out of the soil and then threw it out into commons, where it lay idle for half a century; too poor to grow briars and weeds; too poor to grow ten bushels of corn. On this land, by

the application of eight hundred weight of South Carolina rock, over fifty bushels of corn were raised and the wheat and clover following were all that could be desired. Some of this land thus treated for fifteen years is still improving. Stable manure can be spread over the clover sod at any convenient time during winter or spring; the South Carolina rock three or four weeks before plowing. If your land must have a complete fertilizer, sow half of it before plowing, the rest before the last cultivation.

Manure is a costly article, no matter from what source you obtain it, and must be used with judgment. But saving it is like saving at the spigot and leaving run out at the bung hole. I take no stock in the declaration of some that it don't pay to apply artificial fertilizers. In all my experience I have not known of a failure from their application, where an honest article was used and properly applied. In unfavorable seasons we may not have much benefit from them, but good paying results will crop out before the rotation is over. It will pay to apply proper dressings to land already rich enough in all the elements necessary for a corn crop, even if you do not get an additional bushel.

It is worth something, that your land is little or no poorer after an eighty-bushel crop of corn has taken up the elements for its perfection.

How shall we plow? You, no doubt, have observed that the best corn grows where the furrows are turned up hill—half turned round. Turning all furrows up hill is not practicable, but we can attain nearly the same results by plowing sods and manure under only three or four inches.

The plow, with the jointer that gathers the rubbish and manure nicely into the bottom of the furrow is a humbug in corn farming. Manure covered six or eight inches is beyond the influence of heat and moisture, and will not change into plant food—will lay there inert until the next plowing.

True, this shallow plowing, in some soils and in some seasons, may be an injury, but this may be remedied by following the plow with a subsoiler, stirring up the earth a few inches deeper. On this shallow plowing a roller seems indispensable.

Spike harrowing and marking should be done so as to disturb the inverted sod as little as possible.

No definite time can be given for planting. If we knew whether earing time and rain would come together, in July or August, we would know whether to plant early or late. But as we do not know, we may as well plant as early in May as the ground is in good condition. It will be a hit as often as a miss.

Good soil will allow 9,600 plants to the acre—that is, three feet by three feet, with two plants to a hill, or single plants eighteen inches apart in the drill. If my land were not so hilly, which prevents me from making my drills north and south, I would be crank enough to make my drills next year five feet apart, with the corn eight inches apart. This would give me 13,000 plants to the acre. Thirteen thousand pints, you know, make two hundred bushels. Don't forget the pints! I hope that in this audience there is at least one who has a nice plot of ground that is crank enough to try this. To make sure of a good set, we must use seed liberally.

Tusser, an old English farm poet, wrote many, many years ago—

"Two for the blackbird,
Two for the crow,
Two for the cutworm,
Two left to grow."

In our practice we usually succeed with two seeds where one ought to grow. Replanting rarely amounts to much. Good seed means well-ripened ears, kept dry over winter. Our ideal corn should have long ears, deep grains, thick cobs. Bear in mind that a two-inch cob has 100 per cent. more seed foundation than a one-inch cob. It is important that we have a good variety—one that produces few barren stalks.

In looking over two varieties growing in the same field, one a Chester Gourd, the other Early Mastodon, I find many barren plants in the former, while in the latter (half acre) not one. It is said these barren plants can be bred out by persistent cutting out before they shed their pollen. I have not much faith in this, but the aforesaid seems to indicate that some varieties are more subject to it than others.

Cultivation, one of the most important elements in corn culture, appears to be imperfectly understood by the farmer. He spike harrows, shovel harrows, plows, hoes and scrapes in the soonest possible time—finishing up when the corn is not more than four or six inches high.

What do we cultivate for at this season? To kill weeds or to make the corn grow? Weeds must be destroyed. If it were not, then the less we would cultivate during growing June weather the better for the corn.

A healthy one-foot plant at the end of June is more desirable than a three-foot plant.

Quick and rank growth in June does not advance ear production—that is a matter of about seventy days for the dent varieties.

Quick growth, then, makes long joints with the ears six or eight feet up; slow growth, short joints with the ears three or four feet up, and with equally favorable weather in July and August, the latter is the best. If you must cultivate in growing weather—the last of June—let your shovel harrow run close to the corn, and deep: a little root pruning will do good.

When the corn plant is forty to fifty days old, soon in July, then is the time to commence cultivating for the development of the plant and ear. If the weather is just right, little of it, but, if dry, we should cultivate often enough to keep the soil from baking, and follow this up to earing time, being sure, however, to make our last cultivations quite shallow. Root pruning now is very injurious.

THE HORSE AND HIS BREEDING.

By EPHRAIM S. HOOVER, Lancaster, Penna.

(Read at Lancaster Institute.)

The horse, the most useful of the brute creation, is an important servant to man. He adds much to man's comfort and happiness. And yet how little man often does for him. The success of any country depends much on her horses. What speaks more forcibly to the traveler, passing through a country, of her thrift, comfort and enterprise than a fine breed of horses owned by her? It means good, prudent and thoughtful management in almost everything else. It shows intelligence of her people. It does not happen by chance that this noble animal is more superior in some places than in others, but it is

the result of bringing together the best breeds of horses and combining their higher qualities and getting a better and higher quality.

In treating this subject, let us first take into consideration the breeding of this animal so important to man. Be particular in selecting the stock you expect to breed from. "Like produces like." A good colt costs no more to raise than a poor one, and hardly as much, and when ready for market will often bring threefold as much as an inferior one. The offspring will inherit the qualities of the stock you breed from, and this is an important consideration, and should be borne in mind when selecting breeds. One rule can never fail. The breeding mare should be as free from blemishes as possible, and of a gentle disposition. The kind of horses to be bred from must be regulated for the purpose you want them. If horses are wanted for slow heavy hauling, and are expected or intended for such uses and purposes only, then get all the bone and muscle you can as well as weight, for just such horses are wanted in our large cities in drays and wagons, where great weights must necessarily be transported on paved streets, where horses of light weight and less bone and muscle would soon be jaded and worn out. If great speed and physical endurance, light draught and a good record on the race course are wanted, then select the English blooded horse. This horse, the English tell us, is a cross of the old English road horse, and the Arabian horse, but the finer and better kind of English horses are descended from the Arabian and Bard. They claim for them, that for physical endurance, perseverance and speed, they surpass all other breeds of horses. The English hunter and hackney are, we think, so closely related to the one just described that they may be classed under the same head.

But we want still another kind of horse, different in some respects from the breeds just described. And what shall he be? We will call him "an all-purpose horse," a combination of the two classes just described. This horse has the bone and muscle to do all kinds of ordinary farm work, and, at the same time, is a good speedy driving horse with a good elastic step, kind and gentle in disposition—an aged man's horse as well as a young man's horse, one that is lofty in his bearing, a pleasure in using him and a profit to raise. Such a horse as this is in demand always, and particularly at this time.

Farmers and others using horses for different purposes, owning animals as I have described, need not keep and feed an extra driving or pleasure horse, as is often the case, at an extra expense, for they have all they need combined in this animal. The question may here arise, where will you find this kind of horse? My answer is, by getting a combination to some extent of the two breeds of horses I have just described. The English blooded horse, crossed by some of the best breeds of draught horse, of ordinary weight and a reasonable degree of action, will produce, we think from some of our experiences, good results in this direction.

Some of our best stock raisers tell us that France has been crossing the English blooded horse with the fine draught horse, producing just the kind of horse most desirable for all purposes. From this cross there has been imported into our country a very superior horse of this kind known as the French coach horse, that, we think, more nearly possesses the qualities for an all-purpose horse than any we know of, being of good size, fine in appearance, gentle of disposition, sufficient in strength for all draught necessary on the farm, speedy drivers and

profitable to raise for market. This kind of horse will always be in demand.

Having aimed to point out some of the important points in breeding the horse, and the kind of stock to breed, I shall next give some of the most essential points in feeding and raising the colt and his treatment while quite young until old enough for light work. The new-born colt is a very tender creature and must be carefully handled and made as comfortable as possible, in a warm, light, roomy stable, if the weather is still cool. Great care must be taken not to feed the dam any strong feed, for fear of causing her milk to become too strong, causing gripes and pains in the young colt and soon end its existence, for the least ailment of the colt, the first second and third week of its existence, will soon be fated, if not speedily remedied. The feed for the dam during this period should be oats and bran—say two-thirds oats and one-third bran. An occasional bran mash is quite beneficial. During this period the mare should do no work, but allowed to roam about with her colt a few hours each clear day in some lot or field having good pasture. Be sure to stable at night and rainy days. After three or four weeks the mare may be put to moderate work again and gradually fed stronger, but never left away from her colt at any one time longer than from four to five hours, so the colt does not suffer for want of taking nourishment regularly. When the colt is six or seven months old it should be weaned. The dam, if possible, should be put out of sight of her colt and beyond her hearing. After weaning, feed liberally with bruised oats and bran as a mash at first and later whole oats and bran, and water regularly. Care should be taken neither to feed too much nor too little. Both extremes should be avoided. Feed just sufficient to keep the colt thriving. A mistake is often made by feeding colts too much and keeping them in a close, dark stable, which often affects their eyes and makes them sluggish for want of exercise.

Turn your colts out on all clear days into some roomy pasture field or lot. Let them have an abundance of exercise, sun and pure air. Stable them only at night in winter and on rainy days or extremely cold weather. The second and third years of a colt's life he can almost be kept on plenty of good pasture in summer, and a sufficient quantity of good hay in winter, except the last part of his third year; which, if he is intended to be broken in for light work, he should be fed a reasonable share of grain. My experience in colt raising convinces me that two colts a year can easily be raised on an ordinary farm, and with profit, too, if the right kind of colts are raised, which, when well trained, will sell for at least \$150 to \$200 apiece, and even for more if of superior quality. Can the farmer do anything on his farm that will pay him better, considering risks, labor and investment?

I shall give a few practical suggestions in training colts and young horses. This should begin at the mother's side the first day of the colt's existence. He should be made familiar with man; should be caressed and fondled and all fear removed as much as possible. This should be done repeatedly, until he grows fond of man. Train early and train right, for by your acts he learns. Teach him early in the way he should go, and he will not soon depart from it if properly handled and treated. He should be early haltered, and handled when not yet a month old—not tied for any length of time, but so as to know what it means. He should at the same time be taught to lead and turn right and left, and back. Never tie a colt so young and leave him to himself for fear of strangling, but keep a watchful care over him.

When he becomes submissive caress him for it, remove the halter and let him roam about the stable at pleasure. Repeat this frequently and you avoid much future trouble. Never punish a colt so young if not willing to submit. In nine cases out of ten he will do what you want of him if he understands you. Convince him you are his friend and he will be fond of you. Do not expect too much from a colt. Have patience and teach a little at a time, repeating until he fully understands you. Time spent at this period in training what must be taught him at some time will prove valuable. It is much easier done now before he becomes more set in his ways and of more strength, and will enhance his value, make him more useful and more salable. As he grows older he should gradually be taught those things he will want to know when he is put to work. Have head stall that can be made small and larger to suit his size, have an easy bit on the head stall, so you can easily put it in and out of his mouth by buckling. He will soon know what it is to be bridled by repeating this a few times. In this way accustom him to harness and in all things that he must have on him when he is of the right age to begin work, and you will have very little trouble with him if properly handled after this. A few lessons now and then before he is hitched to anything by driving him about harnessed and bridled with a pair of long lines, so as to be out of danger of his heels, turning him right and left and stopping at the word of command, and a firm hold on the lines, would often cause much less care and trouble later. Do not ride a colt as a first lesson when putting him to work. He does not know what it means. Serious results have followed such imprudent acts, and it is not necessary at this time. Never trust a young horse or colt into the hands of an ill-natured or inexperienced person. Horses are not naturally born to bad habits until made so by ill-treatment and improper management. Never whip a colt to make him pull when first hitched up. Treat him kindly and let him go along at the side of an old well-broken horse. He will soon learn from the old horse by instinct, and so in many other things he will follow after old and well-trained horses.

I have now dealt with the colt from the first period of its existence, and would expect little trouble from him, if of my own raising and training, but we do not raise all horses we come in possession of, and consequently get some that have bad habits, a few of which I shall notice and the manner of breaking them up.

The habit of kicking in young horses may be broken up, but never whip your horse to break him of it. Nothing so completely subdues a vicious horse as throwing him or laying him down and keeping him there until fully conquered. I am willing to show in what manner it can be done without injuring the horse. In many cases this alone will break up the habit, for, as Gleason says, "It takes the conceit out of him and makes him submissive." But a safer and surer way is this: Have a strong harness, particularly the bridle and bit, have a strong ring on top of your bridle, also one equally strong on top of your crupper. Take two one-half inch ropes of the best material from ten to twelve feet long. Tie one end to the ring of the bit, run it up at the side of the horse's head, through the ring on top of the bridle, take it back through the terret ring on the harness and through the ring on the crupper, down to the shaft and tie around the shaft, so that the rope is barely stretched. Do the same with the other rope, and you are ready for action. Have your horse reined up as usual. Now, if he attempts to kick he must throw his head forward (or wants to but

can't) and his other extremities up. If he wants to kick this will set him down and jerk him in the mouth, and punish him severely, and in a short time he will quit the habit. In short, he can't kick when he has this on.

Another bad habit is rearing. This is often caused by too severe a bit for a soft-mouthed horse. In young horses this may be broken up by using an easy bit, if patience is exercised, but a more effectual way is by throwing the horse by a long pair of lines, to keep out of harm's way. Another very general habit some of the best and otherwise excellent horses have is shying at objects along the roadside—at steam engines, bicycles, hand-carts and a number of objects often met with on the road. Do not whip your horse when scared by an object anywhere. If he is an intelligent, well-bred horse, you can teach him to care little or nothing about objects he so much fears. If your horse wants to start back, and wants to run away from the object he so much fears, speak kindly to him. Never whip him for being afraid of anything, or he will soon associate the whipping with the object he so much fears, and get worse the oftener you do it. Get him past the object by kind, encouraging words, if you can, but if he shows a great deal of fear, go to his head and get his confidence by kind treatment and get him to the object he so much dreads. Let him smell of it, and examine it. His nose is his means of examining things for himself, and when he is convinced an object will not hurt him he will care no more about it. Some of the best bred horses are very nervous and spirited, and at the same time very intelligent, and by patience and educating them in this way the habit can be effectually broken up in most cases.

A number of other bad habits might be considered, such as halter breakers, balkers, cribbers, obstinate disposition, lying down, etc. To treat all these at length would be tedious and too lengthy at this time. When you want to purchase a horse you never saw before and know nothing about, look well to his natural disposition. Some horses are naturally kind and obedient, while others are more obstinate and harder to govern, and never show that attachment to man that others do.

The points of a good horse, says an eminent horseman, are these: "A small, thin ear, furry inside; large, round, full eyes, standing out well from the head; large thin nostrils and broad between his ears and between his eyes, and narrow from his eyes to his jowl. Such a horse has intelligence, will learn quickly and remember well." Let all horsemen, and those who are about to engage in any of the pursuits in life requiring this faithful servant of man, consider this subject and aim at that breed of horses and their breeding, rearing and training that I have aimed to show, and I'll venture to say that it will bring about a superior stock of horses for quality, usefulness and profit, and the horse, the noblest of all God's gifts to man in the animal kingdom, will then be, as he should be, and ought to be, better cared for and more appreciated by man.

WAYS AND MEANS ON THE FARM.

By HENRY OMWAKE, *Greencastle, Pa.*

(Read at Greencastle Institute.)

We are here again to-day in the interest of agriculture, which, ever since the energy of man has been exercised on earth, took precedence and has stood first in honor among the vocations of life. As in ancient days, so now it is the chief agency of support for mankind, and the great source of solid wealth. Her garners constitute the treasury of real value and are one of the chief sources of revenue to the state.

An ancient author speaks of the island of Sicily as the magazine and nursing mother of the Roman people, because from that small island Rome drew almost all the corn for the support of the city and for the maintenance of her armies. Yet who will maintain that the soil on the island of Sicily and the region of Carthage on the coast of Africa was naturally more productive than the garden spot of the New World, which we designate the Cumberland Valley—a name which throughout the country is regarded as a synonym of productiveness. Scarcely a tourist that visits our valley but makes note of the sure crop-getting quality of our soil. The hordes of Lee and Longstreet were astounded at the prospect and spoke in the highest praise of our agricultural wealth. And yet, to-day, after a number of the most fruitful seasons and with agricultural plenty, there are those who look only at the dark side and deplore their calling as one fit to be abandoned in despair.

Being together on this occasion in the interest of our calling, let us try and look at the bright side for the purpose of encouragement, rather than dwell on the gloomy prospect, as it is presented by so many writers on the thread-bare topic of agricultural depression.

Whatever ground of complaint there may be in other sections of the country, where the ravages of drought and frost have brought on a condition of want and destitution to be deplored with sadness, surely with cribs and garners replete with grain and with beef, pork and vegetables in abundance, there is no reason for despondency among farmers here in this favored valley, where the labor of the husbandman has been so bountifully rewarded.

Would those who see nothing but agricultural depression and are ever disparaging the value of their own goods by the oft-repeated assertion that "farming don't pay," put as much energy and vim into exalting the industry there would be less discontent and more success; for nothing is more prolific of half-hearted effort and failure than this element of discouragement engendered and fostered by the false assertion that "farming don't pay," to support which they cite the example, of either the thriftless or spendthrift farmer. But in honest inquiry it will not do to be thus unfair. If when skill and industry on the farm directed by the light of science under the economic management of the faithful husbandman will not yield a fair income then only can it be said that "farming don't pay."

Take the one hundred-acre farm with thirty acres in corn, forty in wheat and thirty in grass, potatoes and orchard—and there are many in my presence who can certify that their corn for the last eight years has averaged not less than fifty bushels per acre—allowing the half of the corn to cover the expense of cropping, the remaining half at forty

cents would be worth \$300, which is equal to six per cent. on half the farm valued at \$100 per acre. And surely the income from the remaining seventy acres from wheat and potatoes with orchard and dairy product, supplemented by the profits on poultry and other live stock, would meet the interest on the other half of the farm. It may be objected that only farms in a high state of cultivation will meet the requirements of this calculation. We answer that the poor farm need not produce half as well to meet the interest on the investment because it can be bought for less than half as much.

He that travels through this valley in the growing season cannot fail to observe that some farms produce 100 per cent. more than others equally well situated, and that this difference in result is a sure index to the management. Where industry, enforced by method, and promptness is practiced, reasonable success is assured, but where slipshod methods prevail and the 10th of June is made the farther limit for planting corn, all hands feel easy and are in no hurry, with the sure prospect of reaping light and ill-matured crops which are quoted in evidence that "farming don't pay." In view of the fact that government bonds and others safe securities, bearing four per cent. sell at a premium the charge that "farming don't pay" cannot be maintained by any just calculation.

Whether success or failure is in store for the farmer depends mainly upon the ways and methods in the handling of the means. Dry seasons and the grubworm are too often charged with being the cause of failure when improper tillage and neglect should bear the blame. Some succeed in the raising of crops but fail in turning them to profitable account. Failure of any kind begets the habit of casting the blame elsewhere and leads to complaining where there is little cause for it. The case with many is like that of the man who was pushed off the platform of the horse car and brought suit for damages. On entering court for trial when not a scratch or pain was seen or felt to remind him of injury, yet when his counsel with tragic mien depicted the horrifying details of injury to his client—who was then found crying, and when asked what was the matter, sobbed out—"Oh! I didn't know *I was hurt* so bad till I heard my lawyer tellin' it all." So it is with some farmers, all is well till some solicitor comes around in the campaigning season and magnifies their grievances and tells them "how bad they are hurt." We must not forget that in farming, as in other departments of business, the profits are gauged by the character of the business management. The banker who puts out his money on securities that will be found unavailing at maturity will as certainly be short in account as the farmer who exchanges his earnings for promises made by the vender of Bohemian oats. The grocer or dry-goods merchant who leaves his business in the hands of disinterested or incompetent clerks while he sports at gaming centers, is no more certain to fail than the farmer whose appetite and desire for pleasure keep him away from home to the neglect of his farm.

Other industries, to prove successful must be conducted with the utmost precision and upon the best known methods, and to keep even pace in this age of keen, sharp-cutting competition, the farmer must imbibe something of the same spirit or be left in the race. What is chiefly wanted by farmers is more study and improvement in their ways and a more judicious use of the means put at their disposal. It has been said of the professions that while seemingly crowded in the department of common attainments, "that there is room at the top."

and here is a lesson for the farmer who will find that it is the inferior articles mainly which crowd and suppress the market, and that the much-talked-of agricultural depression falls most heavily upon those who fail to meet or comprehend the demands of the market and crowd it with three-cent cattle when five-cent cattle are wanted; with forty-cent potatoes when dollar potatoes are wanted, and with ten-cent butter when twenty-five-cent butter is preferred. These are things which Alliance platforms and legislation will not correct. The law of supply and demand will regulate the price of our surplus, and as long as we must sell it in a market where we must compete with other nations who are as eager to sell as we are, neither retaliation or reciprocity will give us better prices than our competitors can get.

A reduction on railroad freight of two cents a bushel would give the farmer who sells 600 bushels of wheat an increase of \$12, but if, by more judicious methods and a higher fertility, he can largely increase the yield and reduce the cost of production, he is in the way of a permanent benefit. A closer looking into causes near home and about the farm will prove an efficient aid in reaching, not only a higher standard of products but also larger yields. An inquiry into the cause of leaks and avenues of waste cannot fail to bring good results. The hog that was tanned brown in the manure heap will not be made to look fine or reach the point of profit after a whole summer's good feeding. When a farmer depends on the fermentation of barnyard deposits to keep up the animal heat of his swine, it is unfair for him to say that hog-raising don't pay, and that they eat their heads off when all depends on the character of his *own* head. It is yet too common on many farms that hogs and cattle on the approach of spring bear too many marks of wintering, and if put on the scales would weigh less than they did in early autumn, and are a standing index of the fact that this kind of farming "don't pay." In feeding, regularity is in the line of economy, but more is implied than the mere distribution of provender at stated hours. The good feeder is not the one that is most lavish with the feed, but the successful feeder whose methods are the result of study and observation. He keeps constant watch, and not only feeds the animals but observes their manner of eating and chances of fair play with a view to better supply their real wants at the least cost. When some epidemic disease makes its appearance in any of the cities the first act of the authorities is to enforce cleanliness as a means to prevent fatality. This lesson should not be lost sight of in the treatment of farm stock, for it is a well authenticated fact that filth, vermin and starvation are the chief agents to generate disease among animals.

Science is knowledge, and practice is knowledge turned to account, and correct practice on the farm must be in agreement with the rudiments of science. Chemical science teaches the composition of farm products and points out the elements of fertility necessary for their production.

In order to reach a point of higher success in farming, we must aim at more logical conclusions, in dealing with the questions of soil exhaustion and soil improvement, we must throw aside the factor of indefiniteness which has its origin in guesswork and be guided by the facts as presented by the light of science. If we place a number on the blackboard and subtract therefrom a unit of percentage repeatedly, the number will be lessened by the gradual loss of original units. So it is and has been with most of our fields; since they were first cleared of brush and trees they have been treated to a process of subtraction

without corresponding additions. This is soil exhaustion pure and simple, and is as vigorously practiced by many to-day as in any period of the past. Take the nitrogen, the phosphoric acid and potash—which are the essential and universally recognized elements of fertility—contained in a ton of clover hay as rated in commercial fertilizers and their value is \$8.50, whilst the same in timothy hay is worth \$7.25. From this it is plain that to raise and sell hay crops—with \$3.50 worth of work included at \$6.00 a ton is not only bad economy in that it is giving away for an actual return of \$2.50 an amount of fertility which is badly needed and cannot be bought back for less than \$8.50, but in its effects upon future prospects it is killing the goose that lays the golden egg. How few consider that in selling a hay crop from a field they part with as much of the element of fertility as is contained in three crops of wheat or two of corn, and that he who sells his clover hay for six dollars practices worse economy than he that gives away his wheat straw for nothing. Recently I heard a farmer say he had thirty tons of timothy hay to sell, for which he was getting \$6.00. In the sale of this hay he is parting with as much potash as is contained in four thousand bushels of wheat, and as much nitrogen as is ordinarily contained in ten tons of so-called high-grade fertilizer.

And in the aggregate he gives in exchange for \$180.00 an amount of plant food which, rated at its market value, would be worth \$37.24 more than he gets for his hay, and considering that the cost of labor on each ton for making, storing, packing and delivering is not less than \$3.50 the profit will show up just \$142.24 on the wrong side of the account. Who will not agree that the feeding value of good hay, as compared with corn is not *alone* more than \$6.00. Yet there are many empty stables in which cattle might be fed with profit and the money which must be spent to replace this plant food retained in the purse with no one's back sprained in lifting bales of hay.

Another barrier in the way of success with some is the unknown quantity, guessing and estimating by the eye, instead of weighing and measuring, by which the seller is often cheated or in danger of acquiring a reputation for trying to cheat the buyer. This practice too often has to do with reported yields as in the case of the thirteen-acre field which a man plowed in six days and sowed to wheat in one day to the credit of his team, and after the threshing to ascertain the average yield per acre divided the aggregate of 250 bushels by ten which gave the respectable showing of twenty-five bushels per acre. In live stock deals it will generally be to the farmer's advantage to have the scales determine the basis for calculating the prices.

There are but few farmers who are not put at a disadvantage with the practical stock dealer in estimating on the hoof. As a rule such estimates are in excess of the fact. How often is it that the big load of hay of two and a-half tons when placed on the scales will not exceed three-fourths of that amount? As long as a rail—and as big round as a tub—indicate the indefiniteness, as in the case of the pumpkin which a man raised in his fruit-lot, when describing its immensity, after a pause, he said it was so large that six men could stand around it. In cropping a field we should know the exact number of acres it contains. Unfavorable seasons, with the accidents of weather and other unforeseen events over which we have no control, occasion sufficient uncertainty without taking the risk of loss by making guess-work the criterion for decision and action. There is not a doubt but that a strict account with business would prevent many a failure among farmers. Ac-

according to Bradstreet, about fourteen hundred business men in the United States fail every year. It is estimated that ninety out of every hundred fail in their business career. Does fortune play so fickle with the farmer? Of less than ten per cent. that fail among farmers the greater part go under from an attempt at speculation that does not belong to farming.

Most of business men are adepts in reckoning percentage. Their objective point is resulting gain. A little more calculation and not acting so much by random would often result to the advantage of the farmer. And less drudgery on the part of some with an aim at higher intelligence, with a view to greater usefulness in the community by a better and more liberal support of school and church, and the exercise of such good offices as would enlarge their charity and entitle them to special regard as benefactors of their race, would give them some foretaste of the blessings of real enjoyment. Discontent and a disposition to grumble become a basis of ingratitude, and ingratitude is one of the chief sources of unhappiness. It is said the heathen of ancient days statedly offered up prayers invoking the good offices of their gods, and failed not in thanksgiving at each repast. Confronting this example of the heathen, is it not a reproach to many professed christian husbandmen that they receive without asking and partake without thanksgiving. Rather than others, should not the farmer in his constant intercourse with nature, in being made the daily recipient of her bounty, realize his dependence and yield a grateful response?

Surely his aim should be higher than that of him who wields the muck-rake. In receiving nature's tribute as the reward of his labor it should impart inspiration of gratitude and a holier devotion to Him who has ordained nature and shows his love and beneficence in all her operations. With our more intimate introduction to nature should come also higher aims, purer motives and a loftier ideal of true manhood and womanhood.

FARM DRAINAGE.

By WM. WIBLE, *Gettysburg, Pa.*

(Read at Gettysburg Institute.)

Underdraining will improve three-fourths of the land now under cultivation in this county, and full one-half will abundantly pay for the expense. Drainage deepens the soil, assists vegetation, lengthens the season for labor and vegetation, precludes the necessity for replanting, prevents the freezing out of winter crops, promotes the absorption of fertilizers, supplies air to the roots of plants, improves the quantity and quality of crops, and tends to prevent drouth.

These are facts established beyond all doubt by many experiments in nearly every state in the Union. The lesson this teaches to every farmer is: "Drain your wet land."

I am fully aware of the fact that about all that can be said upon this subject of drainage has already been said by those far more able than I. Not having had the same experience that many others have had, I may not be able to explain the subject of drainage as I would wish to do.

I am firm in the belief, however, that there is no question before the farmer of to-day, touching the matter of the growing crops that is of more vital importance than this. It is the question, and we shall never attain to what may be termed the farmer's millenium period until this is accomplished. For when we begin to examine the subject we shall find that all such questions as deep and shallow plowing, manuring and fertilizing, wet and dry, or long and short seasons, all turn upon this.

He who causes two blades of grass to grow where but one grew before is a benefactor. Sentiment contains the key to success in all kinds of business. Increased production gives increased wealth, and wealth gives increased power of doing good, and the consequent conferring of happiness upon mankind.

If it be true that no man owns deeper than he plows, is it not equally true that no man owns deeper than he drains? In treating this subject I shall have no reference to the drainage of swamps or morass, or the cutting off of springs at the base of hills. The man who is not up to the necessity of this, belongs to the past age. My first proposition which I shall try to demonstrate is this: All soils not classified under the head of sandy, gravelly or light loams need draining.

Poor crops, when cultivation is good, may be traced to two sources, viz: Inherent poverty of the soil, or too great moisture during the season of early growth. Manure may remedy the first, but drainage is the only cure for the second.

Too much water in your soil prevents your seed from germinating and causes a poor and sickly growth; but soils properly drained, pass the water by slow degrees to a much lower, level and thence by drains outward. The moisture needed for the soil to perfect growth is obtained from the warm water in the clouds, and as these waters pass downward and through the canal pores or openings, the warm atmospheric air fills the places thus emptied.

All waters falling upon a field in the form of rain or snow belong of right to that field and ought never to be allowed to pass over it but downward and through it. Water running over the surface of the ground is always carrying away the very ingredients most needed and in the best form for the nourishment of plants.

What lands require draining, and how it shall be determined, are questions we must answer before going further. Evidently swamps, marshes and all visibly wet lands require drainage before they can be profitably cultivated. All high lands holding too much water at any season of the year, require drainage. Most useful plants are drowned by being overflowed, even for a short time, and are injured by stagnant water about their roots. All lands in which planting is delayed in the spring by reason of their wetness, require drainage. In the northern states, also here in Adams county, nearly two weeks may be gained by thorough drainage, an advantage which only those can appreciate who have been obliged to haul their manure over soft ground and plough their land when too wet. Land on which water stands and freezes in the winter should be drained.

How many of you present to-day have not just such land as I have described, upon which the water will stand and freeze? By allowing it to remain there you destroy your crops. During the summer season, your crops are similarly affected on such soils, either by drouth or too much water, when your corn will have a sickly look. As a result your

cribs can only be filled by nubbins and your granaries with grain of an inferior quality.

I know of no remedies for such lands except drainage. Crops grown on drained lands grow much more rapidly on account of increased temperature, and therefore bring about earlier harvests and earlier fall seeding. There again we lessen the contingency of a failure of crops.

An early harvest is always desirable, and if we use all the means at our hands for the perfecting of our lands and growing of crops, we have gained the object sought for.

I am told by physicians that there are times in the history of disease when heroic treatment becomes necessary, and that it is often the last resort. Drainage is the dose of croton oil, or the surgeon's knife, it brings speedy relief or equally speedy death.

Drainage is the heroic treatment in farming, but to be heroic is to be plucky. It is to know what is best to do, and then have courage to do it. But will it pay? is the everlasting question that comes up to the universal experimental Yankee. Of course it will pay, but in this, as in many other things, we must learn to labor and to wait.

But let us see what Mr. Johnson, the old pioneer drainer says upon this point. "Tile draining will pay for itself in two years on drained land. One-half less manures are needed for a maximum crop. I never made money until after I drained."

And so convinced am I of the benefit accruing from it that I should not hesitate to borrow money with which to drain. As we have before hinted, nearly all land will be improved by drainage, for the expense is a permanent investment. A brush drain will last ten to fifteen years, a well laid stone drain twenty to forty years, and there is no reason why a perfect tile drain may not last one hundred years. In all this time the crops are improved both in quality and quantity.

Elaborate tables are prepared by some writers to show how many gallons of water will be discharged per minute by different sized pipes, but they are of no practical use or value to the farmer, for it is impossible to calculate the amount of water that they will have to discharge in any given time.

The question may be asked, what kind of drains are the best and cheapest? We say every man must be his own judge and be governed by his surroundings. If stones are plentiful, we believe stone drains to be the cheapest, but where stones are scarce, then tile should be used. Draining tile are being extensively manufactured all over the country. They are now manufactured at Gettysburg, where they can be purchased at from twelve dollars up to thirty-five dollars per thousand feet, according to the size. I prefer the round tile, for they are the cheapest and I consider them the best.

About twenty-four years ago I drained a field, a portion of which could never be farmed, owing to a number of springs and a stiff-clay subsoil. I used the round tile with entire success. The soil is still free of surface water and in excellent condition for farming and is producing well. Not having an outlet for the water, I dug a well about twelve feet deep, into which I drained the water. This answered a double purpose, both for receiving the drainage and watering stock. It is at this date still in use. I also built several drains about twelve years ago, using stone, at very little expense and with perfect success, drying the land and at the same time feeding a carp pond.

As to the depth and width of drains, it depends entirely upon the

quality of soil and amount of water to be drained; but a drain should never be less than three feet deep.

Every farmer should have sufficient judgment to determine what part of his land needs draining; but if he is unable to determine he should call upon some expert in the business for some assistance or help.

It is not necessary to add more on the subject, for the necessity must be apparent to all close thinkers. It must also be equally apparent that if we use all the means at our hands for the perfecting of our lands and the growing of crops, the most of the uncertainties connected with farming may be guarded against. Why, then, do not more farmers underdrain?

Add to this the increased healthfulness and a greatly improved climate and you have, in brief, some of the valuable results that would flow from a thorough draining of our lands. But these are not all by any means. How it would tone up and invigorate our sleepy plodding farmers! The uniformity of crops, and greater ease of working soils could not fail to put new life into the toilers, they would be better contented with their vocation, they would not farm to live, but live to farm, because it would be a pleasure, and last, but not least, it would pay.

THE CHEMISTRY OF THE SOIL.

By W. T. ALAN, Esq.

(Read at Greenville Institute.)

Plants resemble human beings; in their lives they come into existence from a germ, grow into form and color, each after its kind; have their tender days of infancy and youth, their green age in which they are soft, when they array themselves in gaudy colors, fall in love with opposites, unite, and bring forth after their kind, finally ripening into old age, when they die, leaving behind them the fruit of their lives either to bless or curse the world. Like human beings they also have appetites and must have food and drink, for want of which they often suffer and die. Like their human dependents and associates they are divided into races and each seems to be struggling for the survival of the fittest. They develop under proper cultivation and degenerate with neglect; they are subject to disease, and are often attacked by parasites; they have veins and arteries for circulation; can be bled to death, poisoned, gorged or starved. Their leaves are their lungs through which they inhale and exhale the properties of the air. They depend on animal life for their existence, without which they would perish, and animal life is as equally dependent on vegetable life. Many at this season of the year seem to be dead, while they are but sleeping for a resurrection morn, when they will come forth again clothed with new life.

Plants, like men when hungry, will not eat everything set before them, but must have certain kinds of food prepared so that it is available and suited to their wants, and readily appropriated for circulation. Like men, plants differ in tastes, one using food in which one element predominates, another using another kind; each variety of good must

be congenial to their peculiar individuality and easily assimilated and digested.

Plants do not always show the benefits of the food or fertilizer applied, for various reasons, one of which may be a dry season; for be it known that they take their food in a liquid form, and it is therefore necessary to have moisture, that the element necessary to the development of the plant may be taken into its circulation, and deposited in the new cells that are being formed in the young and terminal growth; and many a man has condemned chemical fertilizers for no other reason than the above.

Four substances or elements that need to be supplied by artificial methods enter into the composition of all plant structure that are more or less necessary to growth according to the nature of the plant and its affinity for the substance predominating in its make up—nitrogen, phosphoric acid, potash and humus. The most subtle of all of them is the first on the list, and whether this substance be applied to the land in the form of ammonia or nitrates, it must undergo a chemical change in the soil and be converted into a nitric acid solution before the plant can take it up; hence the necessity for moisture in the soil to bring about this change and form the solution.

The amount of nitrogen in a load of good barn-yard manure will not cost half or quarter what the same amount of that element would in a high grade fertilizer, yet the nitrogen in the fertilizer is worth double what the manure is because of its ready availability. Manure plowed under in spring often lays in the soil until half the season is gone before the plant is able to appropriate it, because the soil must take hold of the elements, unlock and change them from one combination to another, until fit for the plant's service. Nitric acid is the only available form in which the plant can use the nitrogen of the soil, and barn-yard manure, though containing probably five or ten times as much as the plants utilize, has it in such a lock up state that it is not immediately available.

Just what all the chemical combinations and changes are that take place in the soil during the season is unknown. It is a laboratory of mysteries that we cannot penetrate, and we must be content with what knowledge we can gain by investigation and research and the experiments of our able agricultural chemists. Nitrogen seems to accumulate in soils in which such leguminous plants as peas and clover are grown. They seem to appropriate this element from the atmosphere almost wholly, so that nitrification or the formation of nitrate is a result, and they are found to have increased in the soil after the growth of a crop of these plants. The nitrification curiously depends upon a very minute microscopic plant that grows in the roots of these leguminous plants and is similar to the yeast plant that, in a single night, will spread itself all through the housewife's "emptying" when the temperature is congenial to its growth. This microscopic plant feeds upon the nitrates that the clover or pea vine takes in from the atmosphere through its leaf pores, and deposits it by union with other elements in the form of nitrates of potash and other nitrates. This plant or ferment, it is found, is increased by the application of lime, hence at a proper season, when the weather is not too hot, the plowing under of this class of plants is a source of nitrates that will benefit the crops that succeeded them.

The nitrates of chemical fertilizers are of little or no benefit to spring crops if the fertilizer is applied in the fall, as it generally passes off

into the atmosphere or leaches out of the soil with the rains of winter. When leguminous plants, such as peas or clover, are grown, lime should be used liberally in the soil to assist in the process of nitrification and decomposition. For the same reason lime should be applied to land as a top dressing when manure is plowed under in large quantities, but lime should never be mixed with manure in the heap, as it liberates the nitrogen while it is in the form of ammonia, the most subtle of elements. To test the validity of this statement shut yourself in a close room on the floor of which you have emptied a barrel of hen manure; mix with this a half bushel of quicklime, and so quickly will the elements combine and the ammonia be liberated from the manure that it will be impossible to remain in the room but a moment.

A strong smell of ammonia about the stables or manure heaps is evidence that ammonia is escaping and that you are losing a very valuable and high-priced element, which should be arrested by the process of precipitation. The best precipitant of this is sulphate of lime and its cheapest attainable form is that of land plaster, which is sulphate of lime in a crude state. A barrel of dry road dust through which a half bushel of land plaster has been mixed makes an excellent absorbent and depositor that will add many a dollars' worth of ammonia to the farmer's source of this most expensive and subtle of elements; and it is for this reason that land plaster used on the surface of the soil so benefits the hill of corn. It precipitates the ammonia contained in the dew that falls night after night, and the rains wash these deposits into the soil where they are available for the working roots. Land plaster furnishes the nitric acid necessary for all plants by its power to deposit the nitrogen of the air but should not be used alone year after year and depended upon solely; for potash, phosphoric acid and humus are just as necessary for the use of the plant as the nitrogen, and a continuous use of any one element without the addition of others will soon ruin the land, by drawing upon its resource to such an extent as to cause it to bake and become lumpy. But the farmer who fails to use plaster in his farming operations either as a deposit about his stables or on the soil, fails to avail himself of the highest priced element used on the farm. I have dwelt more upon this element than upon the others because it is least understood and the most expensive, and though more abundant by far than the others the hardest to get at and the easiest to slip away when you have it.

If you burn wheat to ashes all the nitrogen passes off into the air and the analysis shows that it contains thirty-two per cent. of potash and fifty-three per cent. of phosphoric acid, and but two per cent. of lime; and though lime is good for wheat land it is easy to see that when but a twenty-sixth part as much is found in the grain as there is of phosphoric acid, the lime acts as an assimilator and brings about chemical changes in the soil necessary to make available other elements for the plant. It follows therefore that potash and phosphoric acid are left behind in the burning process and will consequently be retained by most soils if not too leachy or so hilly as to be washed out by rain.

Humus is necessary for the structure of the plant as well as the other elements, and is a term applied to a group of elements or substances which form the organic matter of the soil. These range in color from dark brown to black and are the products of decomposed vegetable matter, consequently all clover and other leguminous plants supply it to a more or less extent when plowed under. I have classed the humus as an element of the soil, though it is not such in the strict sense of

the term, but is a compound of carbon, hydrogen and oxygen. It acts powerfully in fixing ammonia and is necessary in the soil to keep it in a loose or loamy condition. A fair test of the amount of humus in any soil may be ascertained by taking a certain quantity of soil and drying and then weighing; then by burning it and weighing again; what is burned up is the humus or vegetable matter of the soil.

Plowing under green crops adds greatly to the fertility of the soil and is a cheap source of humus, but it should be done in the spring or fall when the weather is mild, as such a process in midsummer when the thermometer is among the nineties is apt to sour the soil, from which it often takes years to recover. A top dressing of lime after plowing under green crops is beneficial and will prevent the souring process and assist in the decomposition of the crop.

As in the case of lime, plants need elements applied to the soil that they do not use as food. For instance, salt is not a food for man, yet he needs it to assist in the process of digestion; so the salt applied to land, though not taken up by the plant, will be found to benefit the land by decomposing and digesting other food that can be taken into the circulation of the plant, and also by driving out worms and grubs and causing the soil to retain moisture.

The one who made chemistry and knew all about it said, "Salt is good, but if the salt hath lost its savor it is not fit for the dunghill, but to be cast out and trodden under foot of men;" and so it is the savor of the salt is the chlorine, for it is composed of two deadly elements, chlorine and sodium. Take out the chlorine, the savor, and we have left only an oxide of sodium, a substance never found in plants and not possessing the savoring qualities. The chlorine of the salt is the element found in the horse radish, mustard, pepper, cinnamon, cloves, etc., which give them their peculiar pungency when united with others; substances peculiar to each variety, and all these we use in pickles and preserves as a preservative or savor, just as we use salt as a preservative of meat, etc. Nearly all soils contain enough chlorine to give pungency to any variety of plant or fruit of that nature, but salt will be found to assist much in the development of many plants of this nature where large quantities of manure are used, as, for instance, the onion.

Other elements that are sufficient in the soil for all practical purposes will be found to benefit plants if added to the soil in excess of the needed supply.

A pint of iron filings worked into the soil about a plant will change its color, deepening the hue to a darker green, and if a flowering plant it will add brilliancy to the flowers. The pink flowering Hydrangea changes in color to a bright blue, and if it is a large plant in a box by putting the iron on one side only part of the plant will show pink flowers and part blue.

It is often recommended to try the land by using phosphoric acid on one plot, potash on another, etc., and see what the soil needs; but such a result, though it might be interesting for the time, would be very detrimental to the land if continued cropping was pursued on the basis of such an experiment, for the reason that one or two years would change the whole matter by drawing upon certain elements according to the nature of the plant. Suppose I found that a piece of land contained very little nitrogen, very little phosphoric acid, but a fair percentage of potash, and on this test I proceed to plant potatoes year after year, adding only nitrates and phosphoric acid to the soil; it is

easy to see that one or two crops would draw so on this element that I would soon have land deficient in potash, and my potatoes would run small, and my first thought would be to condemn the fertilizer as worthless. It is better to use fertilizers prepared for special crops. If you plant potatoes, use a potato fertilizer; if corn, one suited to corn; but whatever you do, use plenty of common sense and don't jump at the conclusion that fertilizers are a humbug, and "bite off your nose to spite your face" by discarding them altogether. The farmers that I know that use the most fertilizers are the most prosperous, because they have the largest crops. Most farmers buy a bag of two hundred pounds, put a teaspoonful in a hill and expect it to do wonders. Buy half a ton, use it broadcast and some in the drill, and what you have over and above that adjoining land credit to the fertilizer. "Feed your land and your land will feed you;" this is reciprocity pure and simple.

WHAT SHOULD CONSTITUTE THE FARMER'S EDUCATION?

By Mrs. ANDREW CRAWFORD, *Cooperstown, Pa.*

(Read at Franklin Institute.)

By farmer we mean a tiller of the soil; but all tillers of the soil are not necessarily farmers. Our observations will hardly apply to the numerous so called farmers who "work out" for a few dollars per month; for this unfortunate class of persons, properly designated laborers, do not enjoy many of the advantages of the typical American farmer, traditionally famed for his "independent way of getting a living." A farmer who is not lord of all the land he tills is one of the least independent persons imaginable.

Neither are our remarks intended to apply to the few possessors of vast portions of the soil who are practically "lords of all they survey" nor to those who keep up country places, that they may have convenient resorts when it is desirable to escape from city life—the whirl of society, or the cares of business.

By farmer we mean one whose business is farming—who toils, individually, for profit. That there is little profit in farming by proxy is allowed by most persons in this country who have tried it.

In some parts of this country farmers are known as planters, and in Europe they are called peasants. The tenant in Great Britain, who tills the soil for another bears practically the same relation to his landlord that the slave formerly bore to our southern planter; in either case we see the oppressor and the oppressed. To-day, however, no class of working people have more reason to rejoice in that they are Americans than the American farmer; for with due regard for all the disadvantages under which the labors, it is impossible to overlook the fact that these are few and of small import as compared with the lot of the farmer in most countries. Seven of the best years of the life of every German are wrung from him to support his government. Large standing armies are supported by most countries, where the best men of all classes are compelled to be maintained in idleness the best part of their lives, the burden of their support falling, in the main, upon the farmer.

This single circumstance, perhaps, more than compensates the American farmer for all that he has not which the farmer in other lands enjoys.

You will note that the degree of education men have usually corresponds with the quality of other good things which, as a class, they possess. Where farmers make most money, enjoy fullest freedom, have the best food, clothes and health, you will find them, as a class, to be most highly educated as compared with other farmers. However, it is not our purpose to speak of what farmers have not, but of what they should have; and as this embraces so much, I will confine my remarks to a discussion of only what they should have and could have if they would; moreover we will further limit our observations to a consideration of but one topic—education. And to keep within these prescribed limits our subject becomes—What should constitute the education a farmer should and could have?

The most desirable thing a farmer, or any other person, can attain is a good education. The assertion that every farmer—aye, every intelligent person—could have a good education if he would, may appear startling to the boarding school young lady who has just “finished” hers, or to the collegian who has just “completed” his. The practical value of the average collegiate education is well expressed by the following lines, the soliloquy of a graduate:

“It is really most distressing
That, although my needs are pressing,
I cannot make the money that inferior fellows can;
Nor find an occupation
In this Philistinish nation,
Congenial to a college-bred and cultivated man.
My talents—they are many—
Do not bring me in a penny,
While the unenlightened vulgar go on heaping up their gains;
I can do so much they can't,
But all ‘situations vacant’
Are reserved, as I discover, for the men of vacant brains.”

But those who are really the men of “vacant brains” are those you do no think.

The collegian who lives in an ideal world is educated; his education is not practical, and he is likely to mistake the practically educated man for an ignoramus. Let us try to agree as to what is meant by an education. If it were merely a diploma to be hung up to decorate the wall of a study; that is, if it were something money alone could buy, it would be foolish indeed to assert that every intelligent persons could have a good education if he would. No education was ever completed; no two educations were ever of exactly the same quality. To what extent a mind becomes educated depends upon many things, of which we would mention its social environment—the education of those with whom it comes in contact—the circumstances which determine its habitual employment—and mainly, perhaps, the quality of the mind itself, which so largely determines the state of bodily vigor and the desire to progress. The educated man is a progressive man; he observes, reasons, thinks, theorizes for himself, and profits by the observations, reasoning, thoughts, theories of others; he is not necessarily a sage or a man of much booklore; he need not have attended college. The typical “college education” is not always the education that fits a farmer, or any one else, to live a successful life. A person who can do anything at all cannot be said to be totally devoid of edu-

cation; everything we do gives us some sort of discipline, proves that we possess some degree of ability. Education is ability. Knowledge alone does not constitute education.

“Knowledge is power,” and education enables us to utilize and direct this “power”—by which we mean any of our forces—mental, moral, or physical. When one is able to accomplish some mission in life we say he is well educated. We can educate our fingers, our hands, our heads; but we may be so educated as to be unfitted for the duties of life; we may become well educated in wickedness.

What the farmer and every one else should have is a good education. Whether an education be good or bad is more important than whether it be extensive or limited. To be liberally educated in some wrong direction may be worse than to be as nearly as possible devoid of education entirely.

Dr. Holmes says a man's education begins two hundred years before he is born. But, supposing it to begin at birth, for a time it must depend upon others; upon circumstances over which he has no control, conditions he could not have been instrumental in bringing about or capable of averting. In their zeal to impress children with the magnitude of the obligations due their progenitors, parents too often overlook the duties they owe their offspring. All parents are responsible for the foundation of the education of their children, from the time they are born—or even before, if science be not at fault—until they have reached a state of discipline and development that will enable them to depend upon themselves.

A child is not bound to feel under obligation to parents for the mere fact that he owes his existence to them. It is proper that his gratitude be in ratio to the desirability of his existence; and whether existence in this world be desirable or not depends largely upon whether early education—physical, mental and moral—was attended to or neglected. So much applies to all people, in whatever station, of whatever rank, condition degree, art, craft, or trade. But at a certain age—I shall not presume to say at what age—every one should begin to acquire an education peculiar to himself that will adapt itself to his individual needs, and enable him to cope with the difficulties to be encountered in his particular walk of life. His success in life will depend, for the most part, upon the extent and quality of this early education.

Some farmers (I hope there are but few of them left) regard muscular training as about the only kind of education consistent with their work. They seem to think that education is the boon companion of idleness. They are led into this error because of the conduct of young men of “completed” education and abundant leisure. The truly educated man has never a moment to spare. This is true alike of farmer, physician, mechanic, laborer, philosopher, poet, merchant and monarch. Muscular training, then—physical culture—should constitute a part of everybody's education, whether his work be manual or mental; for the health of body and mind depend each upon the other.

A farmer has no more need of bodily vigor than has a physician or student. The farmer's moral and physical education should not differ radically from the moral and physical culture of others.

We will not attempt to say here what should constitute moral or physical education, it being the object of this essay to show wherein the education of a farmer should differ from the education of those of other pursuits, insomuch as a true farmer is a specialist in his way. A

man in the nineteenth century must be a specialist to succeed in his calling; and there are fewer specialists, perhaps, among farmers, as a class, than are to be found in most other professions.

Farming a profession? Why not? Farming is both a science and an art; and, first of all, it is important that the farmer be educated to see and feel this. Carlyle says, "There is perennial nobleness in work." The foundation of the farmer's special culture should be a full realization of this truth. He should feel the dignity of his profession: he should know his real worth as a farmer, and feel an honest pride in his work.

We might fight our own quarrels—or what would be better still, we might dispense with quarreling—without the assistance of the legal fraternity. We might trust to the observance of nature's laws to preserve our health, and in some instances save our lives without the help of physicians.

We might make our peace with God without the prayers or interposition of ministers. We might enjoy life, in a measure, without the luxuries of modern civilization. Owen Meredith says:

We may live without friends;
We may live without books;
But civilized man cannot live without cooks.

And he might have gone a step further and noted that unless we have something to cook not even cooks can save us. The farmer is the only professional man whose services the world could not dispense with in any emergency. Every educated farmer feels this, and as soon as farmers generally shall have become sufficiently enlightened to realize that they are the only class who can depend upon their own resources entirely if necessary, their independence will have become less of a tradition and more of a reality. If farmers knew their power; that is, if farmers as a class were not deficient in the primary principles of what should constitute a farmer's education, they would dictate terms to the capitalist; they would organize and say to the world give us our due or starve!

Population increases but land does not increase. Every year it becomes more necessary that the farmer be specially educated in his profession.

The question of over-population is not yet an issue of the day in this country, but it is in some countries; and if the farmer of those countries can produce as much from ten acres of land as the American farmer can grow on a hundred, every farmer should know it. He should know how and why; and it should constitute a part of his special education to put such knowledge into practice, and to experiment for himself, if he has ideas of his own.

The farmer's education should be largely practical. If Horace Greely had ever farmed—by which we mean had he made a business of, and earned his living by farming—he would probably never have written "What I know about farming." In every branch of art and science it has been seen that plausible-sounding theories do not always stand the test of practice. When a town-bred man talks of farming, the subject, in all probability, will be skilfully and poetically handled. He may even acquire a farm among farmers themselves, who will wonder unceasingly that such a paragon of tomfoolery should exhibit such logical and rhetorical ability.

But suppose the town-bred man tries farming; he is at once surprised

to find phosphate so much more pleasant to contemplate in fancy than in fact; astonished to learn that there is a bug for the potato, a worm for corn, a fly for wheat, and sometimes a grasshopper for the grass; hollow-horn for the cow, foot-rot for the sheep—in short, a blight for everything. After a single season has passed over his devoted head, if he still survives, he begins to set up Gradgrinds's cry for "facts," and as these fail to materialize in semblance of apples, potatoes and other "vanities," he is likely to feel that, in his case, life is only "vexation of spirit," and to agree with Bishop Berkeley in doubting the existence of matter, and later to don the sackcloth and ashes of his experience and betake himself townward, a poorer but wiser man. This has been the experience of thousands; for which, in almost every instance, the reason has been want of that practical experience which should form a part of every farmer's education. The educated farmer enjoys his work. To do any kind of work well a man must love that work.

It is only the uneducated man—the man who does not think—who, like the horse, works because he feels that he must, without regard to improved methods, or indeed to any method. It is a fact well known to contractors, that an intelligent man will do more of any kind of labor than the man who can neither read nor write. Three men, with only a few ropes, pulleys and mathematical and mechanical principles to aid them, will raise a barn within less time than twenty-five uneducated farmers whose motive power is main strength, awkwardness and a barrel of hard cider.

The farmer in this age who hurts his back lifting deserves no pity. It is more than 2,000 years since Archimedes raised the world without sustaining any injury. Go ye, who know not how he did it, and raise yourselves. Take hold of the straps of your boots. Give your backs another twinge, and if you do not raise yourselves learn more of Archimedes. Depend upon it, the research will raise you miles higher in the atmosphere of mental development.

So much for the special education of the farmer. I have briefly attempted to show that farming is a profession; that the farmer must be specially and practically educated in the science of agriculture and the various arts pertaining thereto; that all mankind is dependent upon the farmer, and that, therefore, the occupation of farming is the most honorable—or at least one of the most honorable—of all professions; that muscular force, to accomplish good results, must be intelligently directed; that true education is discipline, rather than that quality of knowledge which unfits men and women for doing the duties and bearing the burdens of life; that the American farmer, as a class, is more enlightened and less imposed upon than the farmer in other lands; and that when the farmer is educated to see his position, to realize his value, to know his power (which is "knowledge," or the legacy of knowledge), he will assert his rights, dictatorially and absolutely. This, in a general way, has been the object of this essay.

In conclusion I will note briefly the opportunities of the farmer for attaining that degree of culture and education peculiar to broad-minded men and women of every profession and calling.

It is supposed by many that the drudgery entailed by the primal curse has barred the gates of liberal refinement against the farmer in particular; that the amount of labor that falls to his lot is more than is conducive to physical comfort, and more than will permit of mental

development. But these fail to consider that a larger number of great and useful men have been farmers, or farmers' sons, than have been evolved by any other class, which could not happen were all the conditions unfavorable to their development.

The farmer serves no master; his time is at his own disposal. If he takes a day or an hour his crops do not stop growing in consequence. Nature continues what he has begun. Even while he sleeps his work has been carried gratuitously on. Is he sick for a day, his employers—the people—do not complain; he does not lose his job. To feed his mind restores his body; and a day spent in study or in some intellectual pursuit is more needful rest than pure innocuous desuetude. The man who has nothing to do and does it, is the most perniciously over-worked mortal in existence.

That which the farmer may conceive to be his greatest disadvantage may be the most powerful factor which has tended to influence and develop many of our best minds.

The farmer receives directly at the hand of the Almighty, as it were, those things upon which the life, health and strength of mankind depend. He is the Creator's commissary. He is in direct and daily communication with Mother Nature, whom he loves and trusts. If for once she withholds or limits some crop, it is only that she requires time to recuperate her strength, that she may yield the more bountifully another year. Her Bible is forever unclasped before him. Happy is the farmer who can assert his indigenous right to say with the great poet:

"And this our life, exempt from public haunt,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything,
I would not change it."

All our most useful knowledge of art and science has been gained by the study of nature.

Who than the farmer has freer access to her laboratory? Who has better opportunities of amounting to something—of benefiting himself and others than the farmer? The means are at his hand on every side, dispensed with a lavishness that is almost prodigal. He has his full share of pure air, of food, happiness, strength and health. Does any man require more?

The uneducated farmer, if he had been born a prince, would die an uneducated monarch—as monarchs often do die. The class "who, having eyes, see not, and having ears, hear not," has by no means become extinct. Even in the nineteenth century there are many farmers who are satisfied to limit their mental research to an occasional look into the almanac. In youth they learn the signs of the zodiac, and in journeying through life they become, intellectually, mere masters of moon-signs. Until the farmer ceases to make hay in the moon, and to limit his erudition to scandals of the local newspapers, the Farmers' Alliance will be opposed, to some extent, by the farmer, who, after all, is its deadliest enemy.

BEACONS ON THE FARM.

By Miss BELLA M. McSPARRAN, *Furniss, Pa.*

(Read at Doylestown Institute.)

All the world's a stage,
And all the men and women merely players,

And, as realization dawns, there is much truth to be found in the assertion. As the various actors have each a separate and distinct part in representations on the stage of art, so each creature of humanity has his own particular, selected and distinct part in the scenes of the drama of life. Each actor should carefully consider what part his capabilities fit him for, and what part seems to suit him in every way, so that the effect and result may be satisfactory to his employer, to himself and to his observers and friends. No worldly question should demand so much consideration; and when once the decision is made, every exertion should be brought to play to make a success of the choice.

What a throng of conflicting thoughts and feelings crowd the mind of the youth or maiden, as he steps from the stage, on his graduation day, into the world! So far his life has been so free, so happy, that no one has been his envy. Now he begins, for the first time, to gaze into the great unknown and untried future. And what does he behold? Oh! always the brightest and fairest pictures, while the darker ones that the poets tell us must go with the bright ones, to temper their brilliancy, are reserved, unseen and undreamed of, for realization.

To live contentedly and happily, one must be in sympathy with his surroundings; his associates, his amusements must be congenial, and love for something or for somebody must be the inspiration of his life. He who continually longs for a noisy bustling life, can never be content on a farm; neither can the absorbed student endure with ease the gaieties of a city life. The real lover of nature must, and will, cling to the farm, for he does not love merely the beautiful things which he culls here and there; he loves the earth itself, the faces of the hills and mountains, the rocks, the streams, the naked trees no less than the leafy ones, a plowed field no less than a green meadow. He does not know what it is that draws him. It is not beauty, any more than it is beauty in his father and mother that makes him love them. It is "something far more deeply interfused." Something native and kindred that calls to him. The rind of the earth, of this "round and delicious globe" which has hung so long upon the great Newtonian tree, ripening in the sun, is sweet to him. Think of Wordsworth shut up year in and year out in the city. That lover of shepherds, of mountains, of lonely tarns, of sounding waterfalls.

"Who looked upon the hills with tenderness
And made dear friendship with the streams and groves."
And who loved shepherds "Not verily
For their own sakes, but for the fields and hills
Where was their habitation and abode."

On the other hand, think of the society belle spending the long winter months in the country. Prison bars, in her mind, could not be more confining, and her thoughts would be continually of her release, and a return to the gay old life. So the farmer and his family must first of all and chiefly have this affection for the country itself, for the

pure air it breeds, for the freedom of life it permits, for the quiet hours of thought and reading, uninterrupted by empty calls and chit-chat that fritter time away, and not a mere passing admiration for nature's beauties, which many poets love to dwell upon and artists love to sketch.

When we consider the high estimate of the farmer's dignified calling (this too often regarded otherwise than with dignity), and its benefits to humanity, every effort in advanced civilization of which we, as a nation boast, should be furthered in the interests of agriculture. For agriculture was the first, and, as bread must be had for the sustenance of the human race so long as the latter exists, it is likely to be the last occupation of man; so that co-existent with the history of the birth and progress of the race, we have the history of the development of agriculture. And, as education and genius bring to light new methods of work, and improved machinery, the farmer is benefited to the extent of fewer hours of personal labor, less exhaustive drudgery and cheaper productiveness. In the first he finds leisure to devote to his family and to self-improvement. Less exhaustive drudgery fits him to comprehend what he reads and hears; for with a tired body there's a corresponding restless and listless mind. By cheapening the cost of production the farmer finds himself able (if he can sell what he produces to advantage) to better provide for his family. But herein arises the questions of taxation and the growth of monopoly. The farmer should be ever alert to his interests, should be beacons on every hand, for the iron heel of monopoly will grind him whenever he succumbs, and the legislators will exact every possible penny from the farmer and every other laborer who will not care for himself and his own interests.

We are glad to live in this age of progress, to share this higher civilization, and we are not content that the farmer, his wife, his son or his daughter shall not be one to assist in the advancement. Hence we call attention to and encourage many of the beacons that would hasten this end. We may labor to improve the public school system, we may close the saloons, we may organize helpful societies, we may institute reform on every hand, but the home is the great influence of the life. Here are practiced the virtues and the vices that tell on the future life. Here are sown the seeds of idleness, of ungratefulness, of selfishness; and here, too, in the same place are sown the seeds of kindness, of industry, of purity, of love, and of which the world reaps the harvest of good or ill. The ideal home is so often pictured by artists, by poets, by the "sweet girl graduate," and yet it's so near the heart of each one that we love to dwell upon it. An untidy house, children un-presentable, the table untidy, and everything lacking the many qualities of domestic comfortableness, naturally invites comparison to the early family life of the "Vicar of Wakefield," so delightfully depicted by Goldsmith. And Mrs Sigourney says that "the strength of a nation, and especially of a republican nation, is in the well-ordered homes of its people."

The effect of good or bad management and example in the home plainly tells on the after-lives of the boys and girls. If they have been taught the importance of education, of self-elevation and of those around them, habits of neatness, the elements of true politeness, the necessity of purity in conversation and living by precept and by example, they are sure to perpetuate them in homes of their own. So to effect a reform we must begin with the individual life and individual surroundings. Hence, we encourage comfortable homes, well-fitted

and tastefully furnished; which includes not only comfortable furnishings, but conveniences everywhere, and especially in the farmer's kitchen. Here is room for vast improvement on the average; a well-equipped kitchen is the keynote to a well-regulated household; gardening and fruit culture should be practiced for household use, but do not expect the wife or daughter to do the work which only a strong man or a horse can with ease accomplish. We encourage clothing suited to the changing seasons, and to the health of the wearer; choosing and preparing of wholesome foods.

The Levitical laws arranged a list of viands suited to the climate and to the conditions of the chosen people, and strict obedience was required in this respect. What might ordinarily be eaten, also the times and occasions for feasting and fasting, and what meats were approved for each occasion, became matters of conscience to the honored Hebrew nation. Individual appetites and individual tastes were not indulged; and the history of this people makes little or no mention of invalids, and certainly not of that scourge of the present time—dyspepsia. We could scarcely advance the use of the old Levitical laws, but would encourage great consideration of the diet, which effects so largely that needful requirement to perfect enjoyment—health. And there are other requisites to the latter which are quite as important. Perfect health is the choicest blessing, and it should be guarded with our lives.

Then the country roads are not as a rule what they should be. Many beacons have been cast in this direction, from time to time, still the case improves very little. If the farmers could realize that the wear and tear of his wagons and horses would be greatly diminished by the effect of an increased road tax, and a little labor, and that society demands better roads, he would use his means and influence to overcome this want of neatness and convenience. In every farming community there should be an organization where farmers with their families can meet socially and discuss the question of the day in reference to their interests. There are the Grange, Alliance, farmers' clubs, institutes, fairs and other organizations, all aiming to benefit the farmer, and he should go hand-in-hand with their movements. Many farmers assume the attitude of the immortal Macawber, and instead of putting their shoulder to the wheel to assist in hastening a reform, sit with folded hands "waiting for something to turn up." The strength of many organizations lies in their wealth and the abuse of money to further their ends. The farmers can scarcely hope to wield capital in this manner; but they have certain lawful rights as citizens, and they may be stronger than the wealthy corporations if they make good use of their numbers.

We hear talk about the "servitude of farmers." If there is any class of people in this country who should know nothing of what servitude is, it is the people who have not only the political majority, but who stand in the estimation of all thoughtful people as the solid basis upon which the perpetuity of our institutions rest. If farmers are to be a unit of power they must stand shoulder to shoulder, and by such proximity the entire line may be unified and become a formidable faction in influencing national affairs.

In the meantime the young people on the farm discover the best ways of making their life attractive and happy. For there seems to be in human nature an instructive craving for excitement (noticed more particularly in the young) which is not found in the ordinary pursuits of life; and pleasures of some sort have been resorted to, encouraged and

practiced by every nation and tribe, and they seem essential to health and happiness. The savage finds satisfaction in sitting silent with perhaps a pipe in his mouth, or engaged in chewing some drug. The Indian causes the hours pleasantly to pass in exercising his skill with the bow and arrow. The ancient Greeks took great delight in their athletic games, which, besides being enjoyable, were aids to physical development. Outdoor games of the present tend to develop the form, strengthen the muscle and give a rich color to the complexion. Let the old-time farmhouse sometimes lay aside her staidness and be the scene of merriment and laughter. For, says the poet,

"Little by little the time goes by;
Short if you sing thro' it, long if you sigh."

And at all times encourage cheerfulness of spirit and laughter. They are beacons to ward off prosy melancholy. The occasional party and picnic must not be overlooked, with their attendants of pleasure. The young people will enjoy the quiet hours all the more, and will perform their tasks all the better, for the variety. Let music be encouraged in every household; for its soft and mellow strains lure many a wayward boy from the village shop or saloon, where undue gossip reigns as the evening's entertainment, and proves a very den for the pure-minded farmer lad.

Some one tells us "books are lighthouses erected in the great sea of time." So we would have in the ideal farmer's home a well-selected and well-filled library, with the standard periodicals of the day, including a good farm journal (which the farmer cannot afford to do without), where young and old can have easy access to the great, the good, the wise, the practical, the humorous, the poetical of all time; and their beloved voices will never be stilled, their influence will ever be felt so long as library doors are open.

Shakespeare clubs, Chautauqua circles, lyceums, musicales, lectures, all beacons of information and enjoyment, are the necessities of an intelligent country community. Yet pleasure may be in excess. Young persons, especially, often conceive the idea that life is short and they should make the most of it for pleasure. A right-minded person will guard against the immoderate use of it. Dissipation of any sort is always followed by an unpleasant and injurious reaction. Robert Burns beautifully shows the uncertainty of the result where the chief quest is for amusement and gaiety. He had learned the sad experience that—

"Pleasures are like poppies spread,
You seize the flower its bloom is shed;
Or like the snowfall in the river,
A moment white—then melts forever."

Yet pleasures encountered in the way of duty or earned as the recreation after toil, are substantial and lasting. It's the "unexpected that occurs," says the French proverb, and often, with all our planning, quite the opposite takes place. The same stem that bears roses bears also the thorns, and often when seeking the roses we are pierced by the thorns. But, also, when toiling among the thorns of self-denial and sacrifice, we quite as often come upon the roses of pleasure.

Often we hear the cry, "the farmer lives too well." Such an argument tires the patience of a common sense person. When it comes to the enjoyment of the luxuries of life, there are many things which far-

mers, because of their isolation, find beyond their reach; but there are many things available which they can rightfully enjoy. All of these things a farmer has as much right to as anybody else, and his income should be sufficient to allow him to procure them. In these progressive days men in all pursuits are better livers than their fathers were, and the line should not be drawn in the case of the farmer.

Then also we demand *the great beacon*—an education. Any parent who brings offspring into the world and does not provide a foundation for them in this way is unworthy the name. He owes it to them even if he has not been so blessed himself, and it is his duty to advance them to their inclination and his means. They can then advance for themselves, for education ends only with life, and "education is life." This and this alone evidences real citizenship; this alone gives real enjoyment. And education is *not* merely for the preacher, the teacher, the professional man or woman, the gentleman's son or daughter, but for every human being who opens his eyes to bless the light. Nature speaks to her subjects, but the uneducated one "has ears, but he hears not."

Pollock wrote of a man (and many such there be) "who never had a dozen thoughts in all his life." He lacked the ability for thought, because he never practiced thinking for himself. And how sad the condition of such an one! While an educated person's mind is ever active, he mounts into live interest in everything in life, in his sphere. Every item of information he gets is inspiration; it is new power; it is new hope for daily duties; it takes the drudgery out of life, and gives an inheritance to appreciate the largeness, the wealth, the growing value of present existence. America has so many problems at present to solve. There are ethical questions that the newspapers from day to day are teeming with—theology, education, politics—everything is stirring. Farmers must be active, and farmer's boys and girls must help to settle these. The youth of to-day are the hope, the beacons of the future. In their hands rests the destiny of a great nation. Will they dare shirk their duties.

Then, too, what avenues of thought, of pure enjoyment are traversed by the educated. If a firm, substantial, educational foundation is permitted a life, the creature is in relation with the great life of the past, with that also of the present, and reaches on to the infinite hope of the future. Many farmers who may approve of some education for their children, think their boys and girls do not need Greek or Latin on the farm; so they omit the mental development that is derived from a study of the languages, simply because the practical knowledge may not be needed. There is not an existence whose life may not be, and ought not to be, a richer, sweeter thing because Plato walked in the old olive groves of the Academia, and because Socrates believed in ideas and the diffusion of them, and because of the heroes, saints and martyrs who fought the good fight and kept the faith. And every drop of blood that surged in the veins of Shakespeare, Milton or Pitt, has made life a different thing for American people and the boys and girls of to day.

The need, then, is to know the power and potency, and the greatness of life that is made richer by ideals and ideas—the life that is of higher thinking and plain, comfortable living, not the life that stoops to pettiness in politics, in religion, in society. The future of such a life, beacons by the model home, enlightened by education in its practical and elevating form, will have no painful surprises, and no bankruptcy,

that is total, will ever touch his heart or home. The halcyon days for the farmer will have dawned, the ravages of King Monopoly will be stilled, the rights of the farmer will be respected with the day of universal education and enlightenment of his community.

GRADED SCHOOLS.

By A. P. YOUNG, *Millville, Pa.*

(Read at Milton Institute.)

The time has arrived when a new departure is imperatively demanded in the methods of public education. The scholars should have more education. The taxpayers should get more efficient service for the money expended. Very many rural schools are too small.

Salaries of teachers are so low that only apprentices and those out of employment seek to fill the position. Small as salaries of teachers are the cost of many rural schools is entirely out of proportion to the amount of good done in them. Scholars in the rural districts must go from home at large expense if they desire education beyond the merest rudiments. The educational advantages of town and country are unequal. Schools should be so arranged as to furnish sufficient steady employment to teachers to raise the calling to the dignity of a profession. At present in many districts the qualification sought in school directors is the ability to employ cheap teachers, build cheap houses and in general do a cheap school business. To too many people a school is a school, without reference to the efficiency of it, just as a man is a man when he goes to the polls.

It is an admitted fact that graded schools are superior to ungraded schools. If this were not so we could not find educators favoring graded schools whenever they think it possible to get scholars enough together. In years gone by the country school had among its pupils young men, and young women who had been out in the world somewhat and feeling the need of more scholastic training were not ashamed to be found at the public school trying to get it. There is much less of this now than thirty or forty years ago. Why is this so? Scholars in the good old days went two or three miles, sometimes through woods, by road or path, any way to get a little start in education. The schools of to day are certainly in advance of the schools then, but the disposition to get the most out of the advantages they offer is as certainly not so great. Now as soon as scholars reach the age of twelve or fifteen they are out of school, at least out of the public school. Not that they have learned all that might be learned there, but it is no longer to their taste. If a graded or normal school is not in reach and they cannot go away to school, too often they are content to face manhood or womanhood with the meager preparation thus far made educationally. There are reasons for this apathy, this disgust with the common schools of to day. One reason may be found in this; many of the schools change teachers every year and the classes start in and go over the same ground with each new teacher, sometimes advancing a little beyond last year's stopping place and sometimes, owing to a growing disinclination to plod on in this way, the scholar, seizing every opportunity to be somewhere else rather than in the classes, scarcely

reaching the mark of the year before; thus not only losing time but forming habits disastrous to future advancement and usefulness. Then again directors in their wisdom sometimes divide the school term, having a two months by a poor teacher and four months by it may be a poorer one, a little abler physically. Another fruitful cause of the inefficiency of the public schools of to-day is the employment of untrained, inexperienced teachers. Every teacher must commence sometime, must have a first school, but it does not follow that all the girls and boys who are looking out for some kind of business and are not yet quite ready to start in at that business should play keep school a while for pastime. In the report of the Superintendent of Public Instruction for 1888 a county superintendent of a county not far away, says: "Our statistical report shows that forty-eight out of the two hundred and sixty-two teachers employed in the county or nearly one-fifth, had no previous experience. In examining former reports I find that this number does not vary much, being the same last year, and one greater the year before. This is the great hindrance to the progress of our schools; and until all our districts that are able to do so will pay salaries sufficient to keep experienced teachers in the profession, we cannot expect to see the continued advancement in our schools that we ought to see." Can any county pay enough for six months work out of twelve to satisfy a person of the proper ambition and qualification? Can a business that employs those engaged in it only half the year and compels them to seek other employment the other half to eke out subsistence be called a profession?

A connected go-aheadative arrangement is needed for teacher and pupil to do the best work. Under present conditions this cannot be realized in country districts. In the eagerness to have school handy, districts have been divided and sub-divided until the schools are, many of them, too small to admit of good results in teaching. They cannot be properly classified with enough pupils in each class to make it interesting and get up proper enthusiasm. A teacher can do better work with fifty scholars of one grade in a properly arranged and equipped room than he can with twenty-five or less of all grades. He can do better work with forty of all grades than with ten. The schools of our towns and cities are much superior to country schools by reason of the larger number of pupils admitting of proper grading and the employment of teachers specially qualified to do the work in each department. Books of reference too are to be had, so that pupils can follow up and search out many problems that under less favored conditions would pass out of mind and remain unsolved. And notwithstanding the increased efficiency of the schools, by reason of employing better teachers, having libraries and books of reference at hand, together with appropriate apparatus for demonstrating to the eye, much that is better taken in that way, the cost per scholar as found by examination of recent reports frequently fails below the cost of the most inefficient schools in the country. The reason is obvious on investigation. Take a school of eight or ten pupils in average attendance, a house is to be provided, warmed and cared for, teacher employed at, say, twenty-five dollars per month, the cost leaving out all expenses except teachers wages will be about three dollars per scholar per month or nearly equal to the tuition in a normal school. Take another school properly graded, fifty scholars in daily attendance, teacher, fifty dollars per month, and the cost per pupil one dollar per month, with the additional probability that the work done will be much better done.

Country schools fluctuate very much in number of pupils in attendance. So much in this case that an ordinary district may to-day have within its limits fifty children of school age; within ten years, by the natural course of events, this number may fall to twenty-five or less. The larger the district the less it will be affected by this fluctuation. The expense from year to year will remain about the same whether there be twenty-five or fifty scholars. A graded school can without detriment be made much more flexible. A competent principal can be placed at the head—a permanent fixture—a professional teacher—and as many more professors and assistants may be employed as may be needed to properly handle the scholars. If for a small part of the year the school should fill up to overflowing in some departments, the advance students, those perhaps looking toward making teaching a profession could be detailed to their own advantage for duty as instructors. The fluctuating element could thus be handled without much additional expense or trouble and be better cared for than under existing conditions. In a graded school there is a constant incentive, something farther, up to draw the pupil on.

It is a well-known fact that several rooms in one building can be warmed more cheaply than several separate buildings. We hear much in favor of the graded school, increased efficiency, permanent employment for worthy teachers, less cost per scholar, an opportunity for a good education, to be off set against the one great difficulty of getting the scholars of the rural districts gathered together. Is this difficulty insurmountable? Take a district with twelve schools numbering three hundred pupils in daily attendance. If these pupils can all be brought together at one place they can receive better instruction from one-half the number of teachers. In one case twelve houses are to be warmed and cared for, in the other, six rooms will be required and maybe in one house. The saving here apparent would go a long way toward providing means to have the scholars taken to school: to say nothing of the great advantage they would enjoy after getting there.

Now a few suggestions as to how this matter of getting the scholars to the school contemplated might be managed. All scholars within a certain radius could get to school as they do now. Those beyond a reasonable distance to be carried by contract. Having a letting yearly of this privilege of delivering the scholars to school. Let the lowest bidder, if competent, have the contract, reserving to the individual the right to take or send his own children. A shed could be provided for teams and wagons and pupils would often be found capable of managing a team that would bring the scholars along a given route and take them home again at night at a nominal cost. By such a system the scholars of the country districts would have placed within their reach training equal to that now given by the town high schools to their graduates and at a cost—after the system were inaugurated—no exceeding that now paid on account of schools.

And there are other reasons why an equal chance educationally is deserved by the children in the country. In a recent periodical I find the following.

"It is a well known fact that physical decay takes place at a much earlier age in the city than the country. The population of towns and cities is continually renewed from the agricultural class; otherwise they would soon run out. A prominent scientist declares that comparatively few Parisian families survive the third generation. In New York, Boston, Chicago and other leading cities of the New World, the

decadence is less swift but marked. An observing elderly gentleman who has lived in New York during forty years, states that the children of robust men who were reared in provincial places, grow sharp-featured, pale, and stunted. The grandchildren are still more dwarfed and hatchet-faced; sharp in mind but small of brain and limb; cunning, given to much pleasure and little thought; the family dies with them or with their scrofulous progeny. Nine out of ten of the heavy business men of the metropolis," says he, "are country born and bred. They are head and shoulders above their associates who have been reared within brick walls. Do you ask why?" he continued, "because the majority of young men live fast artificial lives. Impure air alone would shorten life and weaken children. But add the stimulating condition which surround them, especially the tobacco habit, in which all young men, or almost all, indulge, and you have cause enough for their retrogression. Why in every walk I take I see young lads of ten or twelve smoking cigarettes. The bootblack and street gamin seize the stump of a cigar and greedily finish it. Do you not suppose the blood is tainted, the very fountain of life tainted through nicotine? They would better be fed on small doses of arsenic. Of course drinking follows. They belong together, one paves the way for the other. And so they who are subject to these habits stultify their manhood and poison the lives of their growing children."

Governor Heard, of Wisconsin, in a recent address before a farmers' institute in his state said: "Standing in the Produce Exchange in New York City, a few years ago, I looked over the five hundred men who to-day represent and control the commerce of this nation, and I said to Mr. Armour, one of the Armour Brothers, who was a farmer's boy, 'How many of these five hundred men do you think were born on a farm?' I was astonished when he told me that eighty out of every one hundred of these men who were controlling the commerce of the nation were born on the farm."

Then I asked him "What about their sons?" and he shrugged his shoulders and said: "Degenerate sons of worthy sires. The city is a great maelstrom; it is a great hopper; it grinds up human flesh and blood, but the farmer's boy of all other boys, is the boy who can stand the grind." If these things be so. If these children of the country are superior physically to their urban cousins by reason of their more fortunate surroundings, let us make an earnest and determined effort to place them on equality, educationally at least, so far as public school training goes. The country air is not only more conducive to health of body, but it is better for the morals. It is only fair—if it can be done—that all have the full advantage of graded schools with cultured professors, libraries, apparatus and all the trimmings necessary for intellectual, moral and social culture. It is possible. We can have it if we will. What say you of the rural districts, shall we push in this direction for what is ours by right?

In the rural districts is the place to establish the ideal school. There is room there to surround it with picturesque grounds, beautiful shade trees, flowering shrubs, creeping vines and beds of common and rare flowers; not alone for ornament, but from which to derive instruction and inspiration. Make the principal of the schools clustered there a fixture during good behavior; the grounds and surroundings, his domain, all under his care, and from many very many of these spots an influence will go out and widen as ripples widen from a pebble cast

into a placid lake until the circles break upon the farthest shore of time.

"There is always a river to cross;
Always an effort to make
If there is anything good to win,
Any rich prize to take.

Yonder's the fruit we crave,
Yonder's the charming scene;
But deep and wide with a troubled tide,
Is the river that lies between."

LESSONS FROM TREES.

By Prof. H. O. HINE, *Hamburg, Penna.*

(Read at Hamburg Institute.)

Not more than fifty years ago, within the memory of men now living, the broad acres of our beautiful farms were covered with a dense forest growth, and from Maine to Georgia the woodman's axe resounded through the depths of the silent woods, bringing to the ground, one by one, these monarchs of the vegetable world. Through the agency of horses and oxen these prostrate trunks were dragged through deep snows to some convenient stream to await the time when the spring freshet should break the icy embrace of winter and carry them to the nearest saw-mill.

We need not go much farther into the past to find the husbandman cutting down his woodland and literally burning much excellent timber for the sake of widening the extent of cultivated farm. Wood, trees, and lumber were often destroyed simply for the sake of getting rid of them.

This wholesale destruction of the forest has not been without its results. No more do the merry raftsmen in the east bear their products down the rivers to some flourishing city; instead, the freighted trains with lumber come largely from Michigan, Minnesota, and even farther west.

The axe is not the only agency which has been devastating our forests. That harbinger of civilization, the locomotive, carries with it death to the trees, not only in the incendiary screech which sends forth flame to set on fire many square miles of territory, but also in the wholesale use of trees necessary.

Thus there are sacrificed, annually, according to Mr. Butler (in the *Chautauquan* of 1886), \$60,000,000 worth of fuel and timber—not to mention that 60,000 acres alone are cut to meet the demand for railroad ties, besides the devastation by fire.

A very proper question to ask is, "What effect will the reduction of our timber acreage have?" Will it render a famine in the supply of wood for various building purposes? That is hardly probable, because as lumber advances in price, other articles will be substituted for wood. Necessity is ever the mother of invention. Dwellings, churches, bridges, public buildings, etc., are now largely constructed of brick, marble, or iron, even the fences of the farm and the lawn are being made of wire of numerous designs. Coal, and natural gas has superseded the use of wood and charcoal as a fuel.

But a most alarming fact stares us in the face as a result of the criminal denudation of our hills and valleys. It is the effect upon the climate.

The peculiar weather of the present winter, together with the general climate changes for years has caused much remark.

Each year the weather is becoming more and more uncertain until President Adams of Cornell University, humorously remarks that "this country has no climate, only samples of weather."

The annual rain and snowfall for many years has shown much irregularity; spring seems to be ushered in later each year, summer is tardy, and rushes to the extremes of wet or dry, autumn extends into what formerly was winter, while winter fails to answer to roll call entirely. Springs, once never-failing, have lately ceased to exist, streams carry but a fraction of their former volume of water in summer, while in winter and spring they are liable to be transformed in a day into rushing rivers fed by the sudden melting of the snows upon the exposed surface.

A glance over the geography of Europe and Asia now in connection with a hint as to its past may illustrate this argument. In Bible times the Holy Land was not the arid and desolate tract it now is, but the devastation of the cedars of Lebanon made it so. Centuries ago one-third of the entire area of Spain was rendered unfit for agriculture by the denudation of the sierras and mountain slopes, in the time of the Moorish kings. The eastern coast of the Adriatic was reduced to sterility by the devastations of the Romans who razed its forests to secure the foundation props in building Venice, that city built on seventy islands, with canals as streets. Many of the artificial deserts of China, India, Persia, and Algeria can be traced to a like cause.

A forest in its natural state is a great reservoir, admirably adapted to receive, and gradually distribute the supply of moisture furnished in a rain or snow-fall. The ground is covered with a thick layer of leaves, twigs, fallen branches, remnants of logs, etc., and become the means by which the moisture is held until absorbed below, and not evaporated into the air.

The slight effects that we are now noticing in our own country already cause our leading scientific minds to view this matter with grave apprehension, and have set on foot various means to counteract it. The subject of forestry is becoming a study, and the University of Pennsylvania, has lately endowed a professor's chair with that subject.

Arbor Day exercises in the public schools are common in many states, and in pursuance of the wish of the Governor of this Commonwealth the schools hold special services in which tree planting and literary exercises pertaining thereto are discussed. This has a tendency to instill the principles of scientific caution on the minds of the rising generation.

Many a farm now has no woodland whatever, not even shade during the summer months for their cattle in the pasture field. To encourage tree planting, the law even in our own state provides an abatement in the taxes of any one who will plant trees of fixed sizes at suitable distances from the public highways.

In the care of trees Germany has set the entire world an example. Her forests to-day are in as good a state of preservation as they were in the days of Charlemagne, one thousand years ago. Whenever a tree is cut down another is planted in its place, only dead sticks, or

twigs are gathered for fuel by the poor peasantry. A certain proportion of the acreage of Germany is always in woodland and this is carefully distributed.

There is likewise an element of beauty and taste arising from the study of trees from an ornamental standpoint.

Neatly arranged shrubbery, around the home and in the lawn, trees sending forth fragrance from blossom and coolness from their shade, fruit rich and luscious, delighting the eye and tickling the palate, all conspire to man's direct taste and comfort.

Another lesson drawn from trees, and indeed all forms of the vegetable kingdom, lies in the nice exchange of gases between plants and animals.

No merchant ever made an exchange or barter more successfully than nature in this respect. Man and animals are giving to the air slight impurities at each breath, in the shape of carbonic acid gas, and using the oxygen of the atmosphere. Vegetation very gratefully accepts this gas, takes it into its lungs, the leaves, and uses it in building up its tissues, giving in return pure oxygen so necessary in animal respiration.

Flowers and plants are thus great factors in purifying the air of the parlor and sitting room, but dangerous in a sleeping apartment at night as they then exhale carbon.

In some countries trees furnish almost an entire storehouse of supplies. This is notably true in the tropics, where their products spontaneously support almost all the needs of the natives.

Ever since the memorable gathering of our first parents in the Garden of Eden where they partook of the forbidden fruit from the tree of the Knowledge of Good and Evil, man has been interested in trees.

They are often the retreats for recreation and worship. In India, to-day, many heathen worship in nature's temple under the banyan tree, while many christian people here seek the inviting shades of some beautiful grove for spiritual meditation and improvement for a week in summer.

The ancient schools of philosophy led their votaries into the groves about Athens, as if more direct contact with nature would enable them to pierce her eternal secrets through. Even Bryant thus speaks of the forest:

"The groves were God's first temples,
Ere man learned
To hew the shaft, and lay the architrave
And spread the roof above them; ere he framed
The lofty vault to gather and roll back,
The sound of anthems,—in the darkling wood,
Amid the cool and silence, he knelt down
And offered to the mightiest solemn thanks
And supplication."

The great fact, however, that stares the American in the face is, greater care in the cutting and planting of trees, or our seasons must lose more of their regularity, and our country much of its fertility and productiveness.

SOME THINGS I DON'T KNOW ABOUT FARMING.

By W. B. SHEDDAN, Pottsgrove, Pa.

When Henry Ward Beecher was to lecture in Lynchburg, Virginia, in 1886, his advertised subject was "Evolution and Revolution." When he came in person, the committee told him the people were too orthodox to meddle with Darwinism. Beecher said, "Tell them I shall speak on 'The reign of the common people,'" and he did, but Judge Bond says he beat them in the end and changed only the name and not the lecture.

So when I was asked to speak here, I thought of calling my talk "What I don't know about farming," but some of my friends thought that a twenty-minute speech would hardly be more than sufficient to introduce so broad a subject. Led by this consideration, I went to work to gather material for my talk, trusting the task of naming to the future.

You who have never tried, do not know how hard it is to tell what you do not know. Long I pondered over my theme and often when I went to bed at eleven thirty I lay awake until twenty-nine minutes of twelve trying to think of things I did not know. In the still early hours of morning, steadily I pursued my relentless search in the, to me, unknown realms of farming; while the shadows even yet were lingering on the eastern hillsides I kept at my work of investigation; not exactly in the way which you call practical, but the way in which a great deal of information is gathered for farmers by the editors of many agricultural papers, namely, dreaming.

But the more I studied the more I became convinced that a large pamphlet or possibly a volume the size of Webster's Dictionary would be needed to hold all the things I have yet to learn about farming; so I adopted my limitation "Some things I don't know about farming."

And now as I put forth upon this deep where I am but a cabin boy while so many of you are captains, I hope you'll be lenient with me. If I do now and then create a stir in your corner of the deck by knocking down a coil of worn rope or by running against the first mate, you'll know I do it in ignorance and am not to blame when I did not know it was you I should strike.

It's a fine thing to know all about farming. I have seen men who did, or thought they did. I don't, and if I did, I shouldn't be here making addresses for my board. I'd be down at Washington marrying Baby McKee or some of President Harrison's relatives and drawing a salary in the Agricultural Department. I am here to stir up things a little. To stir up anything is always an advantage; well, no: I believe I shall take that back in case of these muddy roads or a bull dog with none of his front teeth filed: you'd best not stir them up. I've tried it and the result is never satisfactory, that is to you. Sometimes it is to the owner of the dog when you are book agent. I sold books once myself so I speak from experience. But will drop this as it is too painful a subject.

We often find, however, that it is a benefit professionally to be stirred up. We wake to find that some of our pet theories or habitual methods is not just the most sensible or successful. We need a house cleaning occasionally to brush down the cobwebs, polish the glass and put down a new carpet.

But I fear I am wandering and you will begin to think that there isn't anything that I don't know about farming; but there are several things I don't know; possibly ten or fifteen—hundred.

The first thing I don't know is why we so often measure our farms by acres rather than dollars. Farmers, as a rule, seemed possessed with the desire to bite off more than they can chew. Not long ago a convention of farmers in St. Louis, Missouri, declared that farming is a failure in their section. What is the trouble? Just what I said; biting off more than they can chew and getting financial dyspepsia as a result. It is not the large farms that give largest returns, never. It's the small, well worked, well-watched farms which yield the best income per acre.

Thoroughness in farming pays as attending to your own business always does. Why, do you know, I have actually known men who got rich at farming. I admit it does not look reasonable to you but it's true. How did they do it? principally by attending to their own business and doing it well.

Another thing I don't know is why farmers put their money into the fire I think that is wrong. It's unbusiness like. Do bankers put their money in the fire? Not often. They put theirs in a cooler place—usually Canada—and the money of the depositors goes to feed the fire on Wall street or the Chicago Wheat Exchange. But farmers burn up their own money when they leave their farming implements, their wagons and even, in some cases, their rain barrels unsheltered. Of course none of you do that. The ones who attend farmer's institutes aren't of that sort; but there are such farmers and you who know better ought to tell them that it doesn't pay to give one hundred forty dollars for a binder and throw it away in five years because it's worn out by being kept a large part of the time in a shed which has the ends of the earth for doors, the sun for a window and the clouds for a roof—which often leaks. You must teach them better and the best way you can do it is by bringing in your own plow which stands in the place where you quit plowing last fall.

Another way in which farmers put their money into the fire, is by keeping poor and scrubby breeds of stock. Does it cost more to keep a thoroughbred Percheron than that slightly enlarged edition of an Indian pony you have? Very little. It may take a little longer to curry him as he is larger but there would usually be fewer hills and hollows on his skin to explore. Couldn't you do more work with him? Yes; fully one-third more. Wouldn't he bring more if you tried to sell him? Ah, that's the rub! You can't sell that cross-eyed, shrivelled-up, short-eared mule you have or you would. No good farmer will buy such a horse. Better sell for less than his real value if he loses money for you where a better horse would make it. In these days you must be alive if you want to keep up with the procession and hear the band play.

Again, I don't know why farmers like to work so hard and get so little pay. Look at those two fields of wheat lying side by side with the same soil and equal advantages as to culture and fertilization. Why is it that the one yields fifteen bushels to the acre, the other over twenty? Is that one of the things you don't know about farming? I have the answer for that: it is in the variety of seed sown. Why are you satisfied with two-thirds of a crop when you could have three-thirds, or, possibly, four, by selecting carefully your seed? Too many are like an Irishman, I should have said Hungarian, for it's a foul libel

on us poor Irish to believe all these mean things of us, but I said an Irishman and I'll stick to it now. Well, this Irishman had a potato patch. Now he did the very thing which I have known a great many farmers to do who have potato patches; he planted it with potatoes. In the fall a neighbor asked him how his potatoes had done. "Ah," said he, "illegantly, illegantly." "How many had you?" asked the neighbor. "Two bushels, soir," "Why, wasn't that a small yield?" "Ach, faix an oi planted but one bushel. Begorra oi doubled me money." Thus many farmers seem to put no value on the labor which a crop costs.

Will the additional cost of good breeds of stock and of choice varieties of seed be justified? If you doubt it, ask some one who has tried it, or try it yourself, or-or-or come to me. I won't lie. I never do, when the truth suits. But let me urge you to be more businesslike. Count the work and find what varieties of grain or potatoes cost dollars and grow cents. You want the ones which grow dollars. Watch for new varieties. The first man who tests and proves the new kind of seed is the one who reaps largest returns. Why aren't you that man?

Next I want to relieve my mind of some things about care of farm animals. Do not only take care in selection of good breeds, but take good care of them afterwards. Many horses are kept, during the winter in a stable which has little light, less ventilation and no drainage. Don't you think a horse enjoys standing half way to his knees in a pile of fermenting manure with foul gases rising to his nose? You'd enjoy it yourself, that is if you were a horse.

Then did you ever know any one who ate buckwheat cakes and sausage from seven o'clock in the morning until fifty-nine minutes past eleven, whose dinner lasted from twelve until dark? Ladies and gentlemen, I have—never known very many but I have seen people feed their horses on that plan. I do know a man who never enters his barn that he doesn't throw a few handfuls of oats or half a dozen ears of corn to his horses. Another goes to town and his horses get nothing from six in the morning until six at night, yet when he is at home he doesn't feel satisfied if the horses' racks are empty. It isn't very surprising that these horses aren't in first class. If they were like some people, they would have taken to the use of Dr. Snoodle's Pepsin Tablets or the Climax Liver Invigorator long ago. But they live as long as they can with such feeding as would discourage the cast iron digestion of an ostrich, then they get sick. What now? Send for a doctor? Oh no if it were a person, we might, but we'll just call in a dozen or two of neighbors and they will doctor him. The first comes and we administer a gallon of hot water and a quart of salt. We wait ten minutes. Another suggests that as the horse is slightly feverish he should be bled. We bleed him. Fifteen minutes go by. Why doesn't he get up and go to eating? Some one says he is bleeding too freely, he'll be dead in twenty minutes if that flow isn't stopped at once. Great excitement prevails. A red string is tied around his ear, still he bleeds. A chapter in the Bible is read backwards. Now it is discovered that only a little blood has been lost. It's the water from a broken spout which runs into the stable and makes it sloppy there.

Next we give a quart of whisky a pint of vinegar, two ounces of ginger, a teacupful of lard, four ounces of peppermint and half-a-pint of wood ashes. These don't cure him. Now we get a rope around him and pull and spur until he gets up. Somebody has now settled it

that he has lung fever. Suddenly it dawns upon us that standing is the worst possible position for a sick horse. Then we study how to get him down. We might throw him but that seems a little rough. Some one suggests that we tie his front foot up until he gets tired and has to lie down from exhaustion. In the midst of our planning, the horse walks out of the stable and lies down in the yard. The latest arrival says there is no doubt that the horse is strained in the back. He saw a man two months ago who told him that his wife's uncle, who lives in California, once had a horse which he thought was strained in the back and it acted just as this one does. In a week the horse is all right and would have been so in ten hours if he had not been treated by a band of savages. It would have been no surprise if he had died; it's more of a surprise that he did not die.

Another thing I don't know is why farmers like to encourage sickness. The owners of some farm houses ought to be in jail for endangering the public health. I know a farm house which has a well not twenty-five feet from the kitchen slop pool. Another has a water closet above and within sixty feet of the well. I can take you to a farm house whose water supply is a spring in a hollow. Not a quarter of a mile up that slope is a town cemetery. My friends, if any one should contaminate my water supply by placing festering corpses above it, I'd either close up that cemetery or I'd emigrate. Yet this farmer's family seem to care little for the danger. Pure water and pure air *must* be had at any cost. Dollars won't offset health or lives. Farmers, you have the best opportunities for the best of each, why don't you have them?

In a certain farm house the wife lay sick for six months and during that time a week or more would go by without a bit of pure fresh air being admitted to her room. Is it any wonder that the patient lingered slowly along and never fully recovered? Oh! don't, don't shut the air and sunlight out of your homes! They cost you nothing but the loss of them may cost you all you hold most dear. Twice a day open the doors and windows—not of your parlor which you enter only when you clean house or when your are married or buried, but of your kitchen, your living room and let the air cleanse it. But, you say, it will be cold. What of that? Don't put out your fire when you ventilate but stir up the fire and stir yourself up by moving quickly in this atmosphere of pure oxygen. Both you and the fire will be better for a fresh supply. How many parents are standing by little graves which have received their darlings before they were six years old! One child in every three born laid in the quiet city of the dead ere it has seen six changing summers. On how many little breasts are the dimpled hands folded that would have wrought mighty works if the delicate body had had only the pure fresh air! Oh, sometimes when I see a child wrapped in shawls and blankets and hoods and veils until it looks like a mummy, I long to tell the mother that she is doing the very thing from which the child should recoil in horror; she is starving her child. Starving it of the very thing it must have all the time to be strong and healthy.

Then we must have pure air in our sleeping rooms. If some people were to sleep in a jug, they'd put in the cork before they went to bed. I have entered sleeping rooms in farm houses where the odor was a positive stench. The window covered with moisture, the air reeking with foul emanations from the bodies and breaths of two sleepers, no change in that air for weeks and weeks, and yet people wonder at the

"mysterious dispensations of Providence" when some member of the family sickens with scarlet fever, diphtheria or consumption. It wasn't Providence that brought the disease. God gave the pure air and fixed the laws for the preservation of health and if people will get sick from such simple causes, it isn't a "mysterious dispensation" it's lack of common sense.

You will be surprised to learn that farmers furnish a large proportion of the inmates of our insane asylums. I have this on the authority of the expert, Dr. J. M. Buckley. He attributes this to the disregard of hygienic law and lack of mental food.

Farmers as a rule, live too much within themselves. To be sure farming is your business and as such must take up the largest portion of your time and thought, but if you never rise above your profession, you can never rise in it. Dr. Buckley says every one is insane to a degree, and many a farmer's life by its isolation, tends to develop some hidden monomania. What's the remedy? Travel, reading, healthful amusement and a jolly laugh.

Among the subjects upon which I find indications of insanity among farmers, is that of education. Many will not educate their children lest they leave the farm. Would they be better farmers if they were educated? No; education has nothing to do with farming. Let me tell you that in the next generation the educated farmer will not be the rare exception he is now. It isn't education that makes boys discontented with the farm. Often it is the little interest that the fathers take in the boys. If you had to get up at four o'clock, milk five cows, feed a flock of sheep and curry three horses before breakfast, if you had to set out half an acre of cabbage plants because you're little and it won't tire your back to stoop, if you had to shock wheat with ten thousand beards inside of your shirt and every one scratching like an old hen in an onion bed, if you had to do these things and four hundred ninety-nine others equally agreeable you'd swear you'd never be farmer. Come now, you know you would.

Then see what mighty men have come from these educated farmer boys. Read the thoughts or follow the lives of Burns, Trowbridge, Webster or Lincoln, and tell me that the farmer boy should not be educated! Do you say that you would rather have your boy follow the plow, a discontented and therefore unsuccessful farmer, than be a blessing to his race by scientific discoveries which may rival those of Edison, Pasteur or Hugh Miller? Would you cut off or turn away the current from the reservoir which has given this country and the world its most eminent scientists, profoundest jurists, and most eloquent orators? Never! Never! Let the boys be educated and thus better fitted for life, not for farming nor teaching, nor business, that is later work, the foundation must be the same always and everywhere.

And lastly, as the old Scotch minister used to say when he was just half-way through his sermon, I don't know why farmers are any better than other men. I have seen men, men who knew nearly all about farming, but made their living by telling other men how to farm, I have heard these men say that the farmer's life was the freest, the noblest, the most independent and enjoyable that any man can lead. In fact it was "perfectly lovely." Why did they say so? Let me tell you. It was because they had never tried to drive a hog into the pen when he had an urgent engagement down the road; they never found the neighbor's cows in the wheatfield when the family all had their best clothes on ready for church; they never had a load of hay fall off on a

hot afternoon when a thunder storm is coming up; if they had, do you think they'd say that a farmers' life is all they desire? No, sir they'd say "JEHOSAPHAT!" so loudly that the neighbors would think they were swearing. But is the farmer any worse off than other men? No, I don't think he is. I know men who spent all their lives in search of the pursuit that paid the largest wages for the least work, and do you know upon what they settled? It was farming on the poor-house farm. The majority of those who try to find a place where there is plenty of pay and no work settle down to farming on the pauper farm or study harnessmaking in the penitentiary.

In conclusion, let me sum up, make the farm produce the largest possible crop to the acre; to do this, use best varieties of seed; don't keep scrubby breeds of stock; take good care of a farm animal and farm implements; breathe pure air and drink pure water; take some relaxation by reading, by traveling or by proper amusements; educate the boys and girls, and, lastly, don't consider your calling any better nor any worse than any other. You have to work and work hard. So do other men. You enjoy, generally, the reward for your labor. So do others. Who does more or get more? No one. Then surely you are neither the inferior nor the superior of the rest of mankind. There is only one thing that lifts a man above his fellows or lowers him beneath them. That is true manhood or the lack of it. Let a man be true and honest and upright, let him be a man not alone in years, in stature or attainments, but in goodness and greatness of heart then, though he be the sweeper in the city streets or the moving spirit in the greatest iron mill in Pennsylvania; though he may wander to-night along the lonely country road in the guise of a tramp, or sit by glowing fire amid cushions of velvet and fur; though he be news-boy or member of Congress; lawyer or farmer, if his be the spirit of true manhood, he's a man "for a' that."

Oh, yes: the pen of the Ayrshire farmer dropped a gem when it gave being to those words of the Scotch bard:

"What though on homely fare we dine,
Wear hodden gray and a' that;
Gie fools their silks and knaves their wine
A man's a man for a' that,
For a' that and a' that,
Their tinsel show and a' that,
The honest man, though e'er so poor,
Is king o' men for a' that."

"A prince can make a belted knight,
A marquis, duke, and a' that;
But an honest man's aboon his might—
Gind faith, he maunna fa' that!
For a' that and a' that,
Their dignities and a' that,
The pith o' sense and pride o' worth
Are higher ranks than a' that."

THE POTATO, HOW TO CULTIVATE AND WHEN TO MARKET.

By ISAAC RICHARDS, *Toughkenamon, Penna.*

(Read at Unionville Institute.)

The early history of the potato is involved in obscurity. We have no account of it earlier than 1550, when it seems quite certain it was cultivated in Spain. It was taken to Ireland from Spain by a sea captain about 1565, and was introduced into Germany and France many years later; here it had to fight its way to popularity, as the physicians pronounced it poisonous, and the priests called it an evil root because it was not mentioned in the bible. It seems strange to us that a plant that has so many qualities to commend it should have required two hundred and fifty years to make its way to general popularity, but such is the case; and it was not until the beginning of the present century that it came to be appreciated as its merits deserve.

The best soil for the potato is a good, rich, sandy loam, so located as not to be too wet during a rainy season, or to suffer too much from drouth (the most frequent cause for failure of the yield) if there should be a dry season. I usually select a portion of the field in which corn was grown the previous year. A proper place having been selected, the next question is how to manure or fertilize it.

The question as to whether barn-yard manure or commercial fertilizer is best suited to the wants of the potato crop has been much discussed by scientific people the country over, and many experiments have been made. My plan has been, a medium coat of good barn-yard manure, applied the fall before, or as early in the spring as possible, and plowed under at planting time, and also an application of a good commercial fertilizer at the rate of eight hundred to one thousand pounds per acre. At this point I cannot do better than quote from the report of the experiment grounds of a prominent agricultural journal, as follows:

"On no other crops have we had such telling results from the use of commercial fertilizers as compared with farm manure as upon potatoes and this has been the case during the past eight years without any exception that we now recall. Upon corn, oats and vegetables of various kinds fertilizers have occasionally failed to increase the crop, while farm manures have produced marked results. The experiment which we now record is no exception to the general rule.

"The land had received no manure of any kind for several years. Two plots of one-tenth of an acre each were measured off. The first received three tons of stable manure, or at the rate of thirty tons per acre, in October. The potatoes were planted April 22; were cultivated and hoed; the soil being kept level about the plants. The yield was twenty-four and three-fourth bushels, or at the rate of two hundred and forty-seven and one-half bushels per acre; of which eighty per cent. were marketable.

"The second plot received in place of the stable manure two hundred pounds of Mapes Potato Fertilizer, or at the rate of one ton per acre. The seed planting, cultivation, etc., was the same. The yield was twenty-seven and one-half bushel, or at the rate of two hundred and seventy-five and one-half bushel per acre; of which ninety per cent.

were marketable. The potatoes were smoother and brighter, and less injured by scab than those in the manured plot.

"The cost of the manure was three dollars per ton, or nine dollars for the plot. The cost of the fertilizer was forty-eight dollars per ton or four dollars and eighty cents for the plot."

From these experiments, and others from various parts of the country, the odds seem to be favorable to the use of a properly compounded commercial fertilizer, rather than farm manure in any quantity or condition. Still I feel that I will continue to use *some* manure with the fertilizer for potatoes; as the succeeding crop is to be wheat in most cases. And I find from experience that the potato patch does not need another dressing of the stable manure to raise a good crop; a light dressing of phosphate sown with the wheat being sufficient.

Now for the potatoes: most agree that we should select good-shaped, well-matured, medium-sized tubers. There is a diversity of opinion in regard to how they should be cut, if cut at all. Some of the most successful growers plant the whole potato, others cut to one eye pieces, but most recommend and practice (as I do myself) cutting to two eye pieces, and if the seed end has too many eyes to allow sufficient flesh with each two eyes, cut off and throw away the tip end. Potatoes which have been cut with the plow when digging are good for planting.

As to what are the best varieties for cultivation, there seems to be a great diversity of opinion. It would be as impossible to describe the ideal potato, as, in a few words and to the satisfaction of all men, to describe the ideal wife. In fact each locality seems to have varieties best adapted to their own wants, but few, if any, do well in all climates. I myself have for some years raised only White Stars. They yield better, and sell for as much price in the markets as any other kind. In regard to seed potatoes, it must be borne in mind that if they sprout much during the winter or early spring, they will not grow when planted; therefore for those varieties which have this fault, such as the Early Rose, it is always safest to procure seed from a colder climate. This is one of the good qualities of the White Star; it will not sprout in an ordinary cellar sooner than the middle of April or first of May. I have not bought a bushel of seed potatoes for more than five years, but have always planted my own growing of seed. I plant as early in the spring as I can get the ground in *good* order.

My mode of planting has been to drop the sets in each third furrow, or rather to place them in the mellow soil on the right hand side of the furrow, opposite the land, one or two inches from the solid bottom. This plan has these advantages: the sets are surrounded by mellow earth, the phosphate does not come in direct contact with the potato, they are not planted too deep, and the horses' feet do not knock them out of place. Of course the next furrow covers them. But the manner of planting potatoes seems to have been entirely changed by the introduction of the "Aspinwall Potato Planter." I wish to say here that I believe I never purchased any kind of farm machine which has proved more satisfactory. At one operation it marks out the trench, drops the potatoes and the fertilizer, covers them, and makes a mark for the next row: and does it all *better* than we can get it done by hand.

The manure should be plowed under, a portion at least of the fertilizer sown broadcast and thoroughly harrowed in; then the ground is ready for the planter. I plant about four inches deep, make the rows from thirty-three inches to thirty-six inches apart, and the sets one foot

apart in the row. Varieties which make a very large growth of top should be planted farther apart.

If the ground has been well prepared there will be no attention needed until the earliest shoots begin to make their appearance, when there should be a thorough use of the spike harrow. Don't be afraid of hurting the potatoes, but mellow up the ground. It will kill millions of weeds just starting.

I do not ridge up the soil to my potatoes, but practice as near level culture as possible with a thorough use of the cultivator and hoe harrow. If these implements are well used, but little hand hoeing will be needed; but don't allow any grass or weeds to grow among your potatoes; it does not pay; two crops will not do well on the same ground at once. The weeds not only reduce the yield, but are badly in the way at digging time. I have always dug my potatoes with the plow, as I have never yet seen a digger that I thought was what the farmers want; but I have no doubt that in the near future we will have it. The McCulum, a high-priced digger used in the west, is highly recommended.

In regard to the diseases of potatoes, we are seldom troubled with the rot in this section, as we were last year, owing to the extremely wet season. The scab is more common; its cause and nature seem to be an unsolved mystery to scientific people. It is attributed to various causes, and more numerous than its supposed causes are the preventatives, which is usually the case when the cause is not well understood. I believe there is no doubt that the use of commercial fertilizer instead of stable manure is more likely to secure a clean crop. Some varieties are more subject to scab than others.

There seems but one way of subduing the potato bug, that of poisoning him. Here again the use of machinery comes in to save labor. Townsend Wickersham, of New Garden, Pa., has invented a machine to distribute paris green in solution with water, doing two rows at once, as fast as a horse will walk, and doing it so well that I have not found it necessary to give a second application. I have used the machine the three past years.

I should not leave this branch of the subject without urging upon farmers, who raise any considerable quantity of potatoes, the advantage of using boxes or crates for handling them. Mine are made of pine; sides and bottom one-half inch slats, two or three inches wide, nailed upon ends of one inch stuff; a hand hold in each end; they are seventeen inches long, twelve inches wide and twelve inches high in the clear inside; they hold about one bushel each; thirty-six of them fit nicely in my wagon bed. They are much handier than bags in gathering the crop, and save much labor.

When to sell. The farmer who does not read some of the leading agricultural journals, as well as the general newspapers of the day, is not up with the times. In these papers there are published, from time to time, reports from the agricultural department of our national government, giving statements of the yields of different products, made up from reports from correspondents in various parts of the country, and they are reasonably correct.

From these reports, and other sources, farmers must judge whether the crop is a large one or otherwise. If they have reason to believe it is short, it may be best to hold for a spring market; but in regard to this there are some things to be considered. The additional work, hard work, of putting them in the cellar and of taking them out again

must be thought of; and what is still more important, the loss in weight which will take place. A year ago last summer, I placed in a bag and weighed just sixty pounds of potatoes a few days after they had been dug; about the first of November, when time to put them in the cellar, they weighed fifty six pounds, and in April next weighed fifty-four pounds. So you see there was a loss of ten per cent. Notice though that most of the loss was during the first two months after digging. I have no place to store my crop for winter or spring market. So I have for some years sold as soon as possible, and I have been doing as well as any of my neighbors, and last year a good deal better. If farmers wish to get good prices for their produce they must have good produce to sell. In sorting potatoes make them nice; do not send any cut or scabby ones to market, and you will get a reputation for good stock. We cannot expect to realize such prices as a few years ago, on account of foreign potatoes coming into our markets.

I feel that I am making this paper too long, but I cannot close without urging upon farmers the profit of raising potatoes as compared with that on most other crops. The average yield per acre in Pennsylvania is only seventy-six bushels, while at the rate of seven hundred to one thousand bushels have been raised on experiment plots. I myself raised last year, in spite of the rot and blight, at the rate of four hundred bushels per acre on a small patch. So you see there is room for a great increase in the product per acre. Last year was an unfavorable one for the crop under discussion, as well as most others, but my potato crop will make me about one hundred dollars per acre. I sold from the 1888 crop of two acres, two hundred and twenty-eight dollars and thirteen cents; and from the crop of 1887 of one acre, one hundred and forty-five dollars and sixty cents. These are what I sold, no addition being made for those used for seed, or for fifty bushels or more eaten by the family. There is no mistake about these figures, they are taken from my note-book, and the acres were measured carefully. I do not mention this for the sake of boasting, but to show what any common farmer can do.

Prepare the ground thoroughly after selecting a good location; use a good commercial fertilizers, with plenty of potash in it (most first-class manufacturers make a special potato manure) put it on liberally, a ton to the acre I believe will pay; use labor-saving machinery, which we now have at our disposal. It is not necessary that each farmer should own a machine, one of a kind will do a whole neighborhood. Attend to them, cultivate well, and at the proper time, and raise a good crop of potatoes, not weeds; watch the markets and use judgment about selling, and the culture of potatoes will pay as well, if not much better than any other crop to which we can devote our attention.

Of course it is not expected that every farmer will rush into the culture of potatoes on a large scale next spring, any more than that every dairy farmer will build a silo; better that it should not be so. I am trying to show the wonderful possibilities of the potato as a cash crop, a crop to sell; if the market becomes overstocked they can be fed to stock on the farm and realize much more than the cost of production. Farmers, think of this, and I believe you will be the better for it.

FRUIT AND FRUIT TREES.

By W. B. K. JOHNSON, *Allentown, Penn'a.*

(Read at Macungie Institute.)

The subject we are about to consider is so broad, so deep, that its length and breadth cannot be measured by an article of this nature, therefore we must confine ourselves to but few varieties; and as there is no fruit so universally liked, or generally used, as the apple, we will consider it first. We read in the sacred history that a tree stood in the midst of paradise. Ancient poets and mythologists endowed this fruit with wonderful virtues. We read of the golden fruit in the gardens of Hesperus, guarded by the sleepless dragon; and among the heathen gods of the north, apples were supposed to possess the power of immortality; carefully guarded by the goddess Iduna, were used only by the gods felt themselves growing old; this fruit was revered among the ancients as much, if not more, than the sacred cattle of India are revered to-day. Apples, in the early history, did not possess the excellence they to-day possess, for as much as we can learn, the luscious fruit of to-day originated from some wild crab apples of Europe. We have two or three varieties of wild crab apples growing in this country, but none of our varieties were raised from them; there seems to be no country where the apple thrives so well as in America. Downing gives us an account of two trees grown on the grounds of Mr. Hall, Raynham, R. I., which in 1862 were one hundred and thirty years old, and that the trunk of one of those trees measured, one foot from the ground, thirteen feet two inches; and the other, twelve feet two inches, bore that year from thirty to forty bushels of apples. Again, in Duxburg, Plymouth county, Mass., is a tree twelve feet five inches in diameter, which yielded, in a single season, one hundred and twenty-one and one-half bushels. Mr. Downing has not forgotten little Lehigh, for in Lehigh county an apple tree is reported to measure seventeen and one-half feet in circumference, one foot from the ground, fifty-four feet high, branches extending thirty-six feet each way from the trunk, or, in other words, seventy-two feet in diameter.

To-day there is no fruit in the temperate belt so extensively used for so many purposes than the apple. It is used as a dessert, at lunch, in cooking and baking, made into apple-butter, into vinegar, into wine, and even into apple-jack; all these can be had during the whole year round, as the late keepers will last until June, when the early varieties are already appearing on our markets. By the centuries of cultivating and crossing, we have them from a light green, or yellow, to a dark red, almost black; from a very sweet, unto a very sour fruit; requiring a short season to suit the cold Russias, or a long season suiting the gulf states; yet, bring the apples from the cold north into the longer period of growing, as in the gulf states, and instead of having a winter keeping variety, as in Russia, it will be a summer, or an early fall apple. Take those from a long-season growing into a short season growing and the apples could not ripen before frost, nor make more than probably half growth. The several thousand varieties of apples and their thousands of synonyms are not suited for any and all locations and soils, as well as climate, therefore, the varieties must be selected for *particular soil and climate*. Our growers of this particular fruit are not careful enough in selecting such varieties that suits our Lehigh

county soil. Another mistake is made, that in an orchard of one hundred trees are found fifty varieties, where ten choice varieties would be more profitable; again, there are entirely too many summer varieties and too few winter varieties for profit. As we have already mentioned that the apple is as old as mankind and probably long before man found it in the Garden of Eden (I might have said woman), yet, is it not astonishing to think how little it is studied by our farmers, how little care or pains taken to develop this fine fruit. I may touch this point later on under fruit trees, and must pass by the "*Pyrus Malus*."

We will now say something about the pear, next to the apple, the favorite fruit of modern times; science and skill of the horticulturist has brought the pear of a few centuries ago from a rough, coarse, choking fruit, to one filled with nectar and ambrosia. Among the early Romans, the pear was considerably cultivated: it was common in Syria, Egypt and Greece, and from Greece found its way into Italy. During many centuries the pear remained in its original state, for as Pliny pithily said, "all pears whatsoever are but a heavy meat, unless they are well boiled or baked." Within the last eighty years, subjected to constant production from seed, by hybridizing and crossing and the untiring efforts of the French, English and Belgians, the eden of the pear, it was brought to such excellence that we think it near perfection. The small seckel pear, a Pennsylvania variety, the original tree still stood in the lower part of the city of Philadelphia a few years ago; in quality and flavor it stands unsurpassed to this day.

The pear is not a native of America. In China, western Asia and Europe it is growing wild, in company with the apple, in woody wastes, etc. M. Bosc mentions several that were near four hundred years old, in Holme Lacy, Herefordshire, England, a perry pear, from which were made, more than once, fifteen hogsheads of perry in a single year. In 1805 it covered more than half an acre of land, the branches bending down taking root, and, in turn, producing others. We will now leave old England and drop into the State of Illinois. About ten miles north of Vincennes stands a tree supposed not to be more than forty years old at the time it was reported; planted by a Mrs. O'Kletrr about 1805, would now be about eighty-five year old; the girth when reported, about 1840 or 1845, was then, one foot from the ground, twelve feet and a-half. Nine feet from the ground, measured six and one-half feet, and its branches extended over an area of ninety-four feet in diameter. In 1834 it yielded one hundred and eighty-four bushels; in 1840 it yielded one hundred and forty bushels; it is enormously productive always; size, pretty large; early autumn ripening, and of tolerable flavor. I wish to say that these are isolated cases, and not in general, but are reported on such authority that there is not a particle of doubt of their genuineness.

Another instance, the Stuyvesant pear tree, destroyed in 1867, was planted by the old governor of the Dutch colony of New York more than two hundred years ago, on what was once his farm, now in the heart of New York city.

Gathering the pear and keeping: they should be gathered as soon as fully grown, or as soon as the stem loosens from the twig by bending it upwards; then most varieties should be laid in a cool place to ripen rather slowly; if properly done it is juicy, rich and aromatic. Pears should never be left to ripen on the tree, for in ripening on the tree they become mealy and rotten around the core. To bring out the best qualities of the Vicar of Winkfield, it should be buried in the

ground for from three to four weeks after being taken off the tree—care must be used so as to keep water and ground from the fruit—then removed, placed in a cool dry place, rather dark, and you will be astonished what a fine pear the Vicar then is.

I might name a few varieties that should be more generally cultivated than they now are; for instance, Clapp's Favorite, Burre Clairgeau, Burre D'Anjou, Lawrence, Burre Diel, Burre Giffard, Burre Easter and some others.

We will now turn our attention to "*vites vinifera*," the grape. There is no fruit equally disseminated throughout the whole world as the grape. As there are only four of its distinct families succeeding well in our climate—the Riparia, Labrusca, Aestivalis and Hybrids—we will consider those first. We will name a few varieties coming under these four headings, for instance, the Clinton, Bacchus, Elvira, and many others of this same class are under the Riparia family; Concord, Hartford Prolific, Moore's Early, Worden's Seedling, Pockington, etc., are coming under the Labrusca family; Moore's Diamond, Eumelau, etc., under the Aestivalis, while about all of Rogers', Jefferson, Highland, etc., are under the Hybrid family. You will perceive that under the Riparia family are found nearly all the wine grapes, generally small in berry. Labrusca contains varieties not particularly suited for wine, but for table use. Aestivalis are also good table grapes, while the Hybrids are crossed and were considered good table grapes; but many, particularly of Rogers' varieties, are thick skinned. A little south of us we find the Rotundifolia, which is an immense grower. I saw this grape that a single vine covered all of half an acre; fair wine is made of it. While in California the Tokay and Muscat families are their heaviest yielders. During the last twenty-five years great improvements were made in our native grapes; great credit must be given to such men who gave the best of their years in producing new varieties of merit. However, during this short period there were many new varieties sent out, entirely worthless; and yet to-day there are some new varieties, as monuments of time, equal to the old Concord which surely was the grape for the million, but is now in its dotage. The Isabella has almost ceased to live, nor is the Catawba any longer a profitable grape with us. During the last ten years I experimented with a hundred or more varieties, and now have sixty-nine; and in these sixty-nine varieties not more than twenty are fit for general use. The amateur may find twenty or thirty more, but as I am not here to advertise, or talk about such varieties you should get and which not, I will devote a little time on soil, planting, pruning and trimming fruit. For a vineyard, the place must be carefully selected; soil should be of a deep, rich, sandy loam, or gravel; before setting the vines, the ground should be well worked to the depth of fifteen inches; in setting your vines the roots should be well spread, the lower roots not to be over about ten inches in the ground, the upper roots probably two inches under ground. The first season but one cane should be left to grow; if this single cane makes a good growth the first season, the second season cut back to probably two feet from the ground, and then two canes may be left to grow, when it is probable a few grapes may be made. I had one vine that the second year produced four and a half pounds of fine grapes. A mistake is often made with somewhat inexperienced amateurs, to let all the canes grow the first year that may be likely to start; the following season the superfluous canes are cut out, or at least should be, then all that growth is lost, and the

one cane left is generally weak, being robbed of the amount of wood cut out or thrown away, setting the vine back generally one year. In thinning out the fruit, all imperfect bunches should be removed as early as possible; it will improve the perfect bunches. In cutting grape vines, I may not have room or time to explain the various methods, but generally there is too much wood left. I cut my vines back to leave but two fruit eyes to grow, after having formed my vines; then after growth of a few inches is made I pick out all the laterals. The grape vine is a great feeder; it should receive every year a dressing of good manure fertilizer, and as the wood contains a large per cent. of potash, it should be placed within reach that the vine may utilize it. Good cultivation is an important part in grape culture; grapes will not thrive in sod, no more than corn or potatoes. Some varieties grown in sod are often entirely destroyed by the "*lobesia vatrana*," or grape worm, while under good cultivation only slightly affected. As time will not permit me, I will leave mildew, black and brown rot for another occasion.

I will now draw your attention to that much neglected fruit, the quince. The first notice we have of this valuable fruit was in the city of Cydon, in Crete or Candia, whence it received its botanical name, Cydonia. Among the Greeks and Romans it was used as a preserve, and more highly esteemed as with us. The apple-shaped quince is best for early purposes, and the pear-shaped for later use. Its uses are so well known that no remarks need be made here; however, I wish to say that this fruit tree is more sensitive to good culture and good feeding than perhaps any other, and yet the prevailing opinion is to plant the quince in any out of way sort of place. The quince naturally thrives best in a deep and moist soil, but as all deep soils retain moisture better than shallow soils, whether on the hillside or in a valley, therefore, it is not necessary to have a brook or a spring to plant this noble fruit on its banks; but what is more essential is good cultivation and a yearly top dressing with good manure. What a pitiful object the quince tree makes standing in sod, with its dark colored branches, sickly growth and imperfect fruit; no wonder the fruit is wormy, the borers in the stem, or trunk, the leaves affected with mildew. The effect of this will be considered under fruit trees. Take away the sod, dress it with good barnyard manure, take out those spindly twigs, dead and crossing limbs, let air and sun enter the head of the tree, and, if the vitality has not been stunted by too long neglect, it will prove to you that a little care and attention bestowed on this fruit will repay its owner by its golden fruit.

We will now turn our attention to another fruit, which of late years has become an article of general cultivation in this country—the peach. This fruit is a native of Persia and China; was brought from Persia by the Emperor Claudius into Italy. It was considerably cultivated in Britain as early as 1550, and brought to this country by the earlier settlers. China and the United States are the only temperate countries where it attains its greatest perfection. There are some very queer fables or notions of this delicious fruit recorded in the ancient Persian and China history; among some it was considered poisonous; among others the tree of life; among others that it would bear but once in a thousand years, etc. It is safe to say that there is no country in the world where the peach is grown to the extent as in ours, and we are happy to say that we have not found any poisonous effects from it. The fruit is not the only part of the tree used, but the leaf, when

bruised in water and distilled, produces the peach water so much esteemed in flavoring delicate articles in cooking; and as there may be good temperance-inclined hearers, I will not say what it produces when steeped in brandy, for fear it might upset their equilibrium in trying it, for you know Americans would not be Yankees without trying the experiment themselves. Peach growing in our country is in its infancy, and it might be well for me to make some remarks on this particular industry before taking up another part; and in order to give you a better idea, I must commence with the seed; and let me illustrate, by this, no farmer would sow imperfect seed wheat if he could help it; and what is true in wheat, is also true in fruit seeds; varieties may differ, but nature is the same in either one or the other. A perfectly grown peach, well ripened, has naturally a well-matured pit, or seed; an insipid or bitter peach which sometimes is growing on the inner side of the tree, while the perfectly ripened one is basking in the sun and light of the same tree. Now let us take the pits of those two peaches, from the same tree, and plant them, and mark the difference; the one perfectly grown seed will make a fine thrifty young tree, while the insipid, imperfectly grown peach, in the shade and the sun's rays not reaching it, will produce a feeble growth, and will stay a culling, or runt as long as the tree exists, and naturally will not bear the same luscious fruit as the perfect peach pit does. Yet this very class of trees our farmers are buying, because they are cheap. What a mistake they do make. I can scarcely leave this without drawing the attention to another equally as great a mistake. Pits are classified into two classes, namely, natural pits and Jersey pits; the natural pits are from trees which never yet had been budded; the Jersey pits are all such pits that come from budded trees, probably ten, twenty times over. By this budding and using the pits of budded trees—and the buds from slightly diseased trees will communicate the same disease to the pit or kernel, until finally the fresh cut of a root is reddish-yellow, or already slightly brash—it may grow for a few years and bear a few crops of peaches, but, just as soon as the wood becomes more brash, or of a deeper red color, unable to make good and wholesale sap to send forth into its branches, the chemical action of the sun sours the sap, the tree forms gum at every leaf as clear as drops of water after a rain. As soon as this takes place the tree is done, and there is but one remedy—cut it away. The other, or natural pit is having a solid root of a yellowish-white color; this is the tree that lasts and may bring you a dozen full crops. Which do you think pays you best to plant, the tree from the natural pit or the Jersey pit; the one bringing a dozen crops, the other two or three crops? Well, then, I know your answer. Why do you buy that class of trees? Because they are cheaper. I had at tree in my yard, variety "Stump the World," planted by my father-in-law the spring following the fire of 1848: about five years ago that tree bore its last fruit. One year I gathered nine and one-half bushels of peaches from that tree; some were picked by the school children over the fence, making at least half a bushel more. The height and breadth I never measured, but the trunk at its thinnest part between the roots and limbs measured eleven and five-eighths inches of wood, without the bark, in diameter. It may be that there are those here who are planting Jersey pit trees, doubting my saying; and well they may, if they take their own experience as a basis. We read that a peach tree on M. Joubert, near Villemuve le Roi de l'Zonne, France, is ninety-three years old, and believed to be

over one hundred years, is in perfect health and vigor. Our farmers should practice the shortening-in mode, for all long-lived peach trees we read of the shortening in system was practiced. Alas! for our poor peach trees after they are planted. The mode generally applied is help yourself, or as the German saying is, "Eat bird or die." Farmers have learned that peach growing pays even with the poorer class of trees generally planted, and would pay them much better were they to plant a better class of trees. About the much dreaded "yellows" so destructive in some parts of our country, we will mention later on. Will next make some remarks about the plum.

The plum is a native of Asia and southern Europe. We find that the soil and climate of the Middle States is admirably adapted for the plum culture; and such varieties as the Washington, Jefferson and several others sorts are surpassing in beauty and flavor the most celebrated varieties of England and France. Plums for dessert should be fully ripe; but as they are so well adapted for preserving, canning, tarts, pies, etc., that the housewife is not willing to do without, even though the curculio and black knot may interfere with this favorite fruit; and as these diseases and insects are made a close study by our government, it will be, and is even now, that whoever will follow the directions of those careful investigations can have the fruit.

As my time is pretty well exhausted, I will not enter into other varieties, but enter into fruit trees, their production, cultivation and general treatment. The first, and of no small importance, is the young tree set in the orchard for fruit bearing. The best trees are those budded near the ground, so that in transplanting the bud will be set a few inches in the ground; if thus planted, the joint or bud will strike root, and as the surface roots are the feeders, or first roots, they will work harmoniously with the fruit, ripening at their proper time and having the right color and flavor; while the bud or graft may have some considerable influence over the root on young trees. In old trees, being top grafted the influence is very little, as the roots are about all made; therefore care should be exercised in grafting a large tree with such varieties ripening about the same time as those on which the grafts are to be set; for instance, we take a Baldwin apple and set the grafts on an Early Harvest, as the roots are formed; the Baldwin grafts have little influence on the roots, consequently the roots work hard to make their Early Harvest apple, which causes our Baldwin to be forced out of its season. After the time for ripening the Early Harvest, the roots cease to work, or produce sap; the effect will be that the Baldwin apple wilts, loosens on the stem, drops and rots. There is scarcely a farmer, who had considerable grafting done, but who has more or less of such trees.

I may further state that grafting has much to do in color and shape of the fruit. Look at our exhibits at the county fairs and examine this same apple, the Baldwin, its various colors, and even shapes. Cleft grafting should never be done to small trees, as it takes from two to four years to cover the cleft or split made through the heart of the young tree; and as the cleft never closes up entirely, except in very small trees, and as the wax frequently loosens before the cleft is covered on the top, water will enter and affect the heart of the young tree with rot; small as it may be, in time it is almost sure to tell. Under the head of apples, I said we would have something to say of its general treatment. Many points I must leave, but will now point out a few which the most inexperienced may notice and ask the reason why all

this. It is so common a practice that it has come to be a second nature that two crops should be had from the orchard, one of grass or grain, the other an abundant supply of apples; besides used for a pasture, and generally giving the orchard less manure or fertilizer than the open field adjoining. For one moment think what you are doing, and will use the old saying familiar to all of you Lehigh countians, "der gaul wo der hafer ferdient, griet en net." What are the effects or consequences, the tree will take up all material in the ground to make wood and fruit. When the ground becomes poor or exhausted, the first signs are that the bark loses its color, becomes of a dark mildewy or mossy nature, dead limbs appear, stunted growth, and finally the tree dies, one limb after another, until the whole tree is gone. It did not die from old age, nor from any sickness (yet parasite and disease are more apt to prey on such trees as on healthy ones) but from neglect; the tree died of starvation. Being the orchard a young tree is generally set where the old one stood; and what are the results? the boress, mildew and blight soon attacks the young tree and it dies; then the tree is complained of, and the nurseryman abused, when the fault laid much nearer home.

There is another effect often produced by trees neglected; what we call blight. Pear trees are more affected, or more sensitive than perhaps any other; but as others are more or less affected from the same cause in somewhat different ways, as it may as well be here described as anywhere else: All warm-blooded animals have lungs supplied as the breathing apparatus, to take in the oxygen and throwing off carbonic gases. The leaves of trees are to the roots and growth of the tree what the lungs are to us—their breathing apparatus. Nature has carefully guarded the cells to take in the gases necessary, by placing them on the underside of the leaf, where dust and rain are not so apt to close up their cells or when the growth of the tree is stunted for the lack of proper ingredients necessary to health. The leaves are affected likewise; and as the roots are sending sap upwards to form leaves, no sooner are those leaves started than there is a reaction, which the leaves produce on the sap flowing downward forming new wood. You will, I think, perceive what influence the leaves have on such new wood. If the leaves are healthy it is quite natural that the new growth be a healthy one, but when the leaves are attacked by mildews and cannot do their work properly, being weak and enfeebled, we must expect the new growth no better; consequently, dark spots will appear on the bark; in the course of a year or two scabs or scales are formed from a mere speck to more than an inch. Did you ever notice this? If so, did you give it a thought, as to what the cause might be? There is a great difference between the animal and vegetable kingdom. One is moving at will, the other is fixed; and yet, in some respects they are very similar. I will draw an illustration: a cow fed on straw and water could scarcely be expected to give much milk and butter: a tree not fed by the necessary ingredients will soon become unprofitable. Bestow the same care on your trees as you do on your milk cattle, and the day is not far off, when, instead of buying your winter fruit, raised in York state, Michigan and elsewhere, you have plenty for your own use and to sell. It does seem strange with all this fertile land, so well adapted for fruit culture, lying around us that we have to depend on our neighboring states to supply us with fruit, which are naturally no better adapted to fruit culture than our own, and I have doubts if they are as well adapted as our own state. The only difference I can see is

that their land, in many respects, is not as well suited for cereals as our fertile valley. When they began to study what else they could use in place, and as fruit seemed to do well under proper care and culture, consequently they entered it with a will and energy. And just as soon as our farmers are making it a study, willing to learn by others' experience, they will once more be successful farmers. Lands will bring better prices; we will see less handbills drawing the attention to assignee sales, and the sheriff's office will not be such a lucrative one; prosperity and improvements will be noticed until our country will be as one beautiful garden. Then be up and doing! Lay off that sleepy business sort of way; form yourselves into farmers' clubs in each township; devise plans, methods for the general welfare of your own individual selves. In so doing you will raise yourselves above the general tide or current. Times were when a farmer had only to make both ends meet; while the increase of lands made him rich. That day is past. And I will warrant to say that the rising young man is he who makes his crops a study, whether fruits, tubers or cereals, however poor he may be when setting out in life, is sure to lead onward and upward to influence, affluence and ability. What are we to do? Are we too old to learn? Must we sit with our arms folded, constantly complaining to others about our misfortunes, fault-finding with the more energetic ones, complaining that the goods of this world should be more equally divided, forgetting that all these blessings were put within our reach? It was Dr. Franklin, I think, who said "He who would thrive must hold the plow himself or drive." The thrifty man has no time to complain; he repairs the damages as soon as he can get at it.

I have made some promises to treat peach "yellows," and perhaps one or two others, but as my time is about all taken up, I must leave it.

The currant, the raspberry, the strawberry and others, are all fruits well worthy of notice in an article of this kind, but as each one of these varieties should be taken up separately and not collectively, to do justice. Hoping you will bear with me, as only allusions in a general way were made, and not supposed to enter into minute details; hoping the little that was said may cause an impetus to search into fruit culture and fruit trees, until every farmer is not only following the directions and advice of others, but he himself an experimentee discussing the causes, influence and effect of bacteria generally.

OUR AILMENTS.

By Mrs. LIZZIE S. PARRY, *Breadysville, Pa.*

(Read at Doylestown Institute.)

There was once an old colored woman, so the story runs, who applied to the doctor for medicine. "I'm so delicate," she said. "Well! what seems to be the matter with you? You look stout and hearty." "Yes, I'm stout and hearty enough, but I'm so delicate." "Do you sleep well?" "Oh! yes; I sleep well, but I don't seem to want to do anything; it's a great trouble for me to move; I'm so delicate." "Is your appetite good?" "Oh! laws yes, honey; I eats plenty; but I

don't seem to want to cook anything, or have much to do but sit in my chair. I'm so delicate." There are others in this world who, like fat Aunt Becky, are able for the eating and sleeping and the easy chairs, but who, when it comes to the work and worry, are entirely too delicate. The reason I mention this little incident is to show that the ailments of which this paper shall treat are not confined altogether to the farming community, as this kind of delicacy is one in which they cannot afford to indulge.

We do not think farmers, as a class, are any more susceptible to the ills that afflict mankind than are other members of the human family; differing from the rest of the world in being, not, perhaps, so delicate, only a little more sleepy. You see during and just after the war, everything they had to sell brought such good prices, it made them feel so cozy and comfortable. They fell asleep, and, like Rip VanWinkle, took such a long nap, that when they awoke they found the world had forgotten them. No farmer had been seen in the halls of legislature looking after the interests of agriculture for so long a time, that when any laws affecting it were brought before that body, they died for want of proper attention, or were looked upon as obsolete. Whether the Farmers' Alliance will be the physician that can cure these symptoms of lethargy remains to be seen. People cannot always be trusted to tell what ails them. The patient knows he is suffering, but he does not always discover the nature of his malady; and we doubt very much if even farmers will think they are sick enough or be willing to be cured by swallowing such pills as—the abolition of the national banks, and the establishment of pawn shops over the country, where the farmer may receive two per cent. on deposits. And here is another silver coated time. We demand that the amount of the circulating medium be speedily increased fifty dollars per capita. According to Secretary Noble's last report, it is now about twenty-four dollars to each person. Even if this is advanced to seventy-four or to over forty-five billion dollars, I cannot conceive how this is to benefit you or me until we have earned it. Perhaps a government official is to go around the country and give to each member of it an extra fifty dollars; but if he did, by the time he was through, in every half dozen persons one would have the three hundred and the other five be as poor as before. But farmers do not propose to live upon government charity; although it is quite as honorable to feed a nation as to fight for it, and just as deserving of help. Another thing to which we have taken exception. "We demand" such and so. That article has been out of use ever since one memorable fourth of July, when we added the ingredients, liberty and equality, to the National pharmacy. These, propounded by an intelligent chemist, with a number of grains of common sense, make a most delightful mixture.

The people have been taking such large doses of it, and it has agreed with them so well, it will be troublesome to get them back to the old method. Speaking of equality reminds me of something I heard the other day. A farmer's wife, who had just awakened to the fact that she had an ailment, was complaining because she was not allowed an equal privilege with her husband in making a will. "Talk about this boasted declaration of inalienable rights! Women have no part in them. They mean men; men to the end of the chapter, and then they finish with amen!" And she went on to say, "Didn't I help you to earn our farm? Didn't I, when we married, have three hundred

dollars, while Joseph had only one hundred? Haven't I got up as early in the morning and gone to bed later at night? Hasn't he paid out of our yearly profits the wages of his two men, while I have had but one girl as help in the house? Hasn't it cost him three times as much for cigars as it has me for candy and ribbons, to say nothing about oysters and peaunts bought at sales? Hasn't he had two mowing machines to my one washer? Maybe my bonnets do cost more than his hats, but when it comes to boots and shoes the balance is on the other side. And yet, if he so please, he can will half the property away, or if he leaves no will, the law gives half our property—as we have no children—to his relatives. I'm not saying what he will or will not do; only talking about the justice of the law, as viewed from a woman's standpoint. Strangers will have a right to pry into our affairs, to turn me out from the old home, and to break up the old associations, just at a time when my eyes will be so dim I can but stumble, alone, on life's pathway, without the strong arm that had guarded and supported." I tried to console her by saying if her husband did allow such a thing to happen, it would be because he was afraid some man might marry her for her money; that the idea was to protect her from fortune hunters; but my words had no effect. She said it was more likely some second wife would have the chance to spend the money she had helped earn and save; that she didn't care for that kind of protection; it was like some folks hold an umbrella, so the one walking with them gets too much of the cold drippings. Well, there are some women who are afraid of being widows, and some who are not. My friend did not look on the bright side of life; just then she was not counting over the "marcies." She forgot what a dreadful thing she had escaped—that of being an old maid. She forgot about the courtesy a woman receives, because she is a woman, when she gets into a crowded street car, and is allowed to hang on to the strap. Remembered not the onerous burden lifted from her when she obtained a husband able and willing to carry the family pocket book. Recollected not who it was pumped all the water, carried all the coal, attended the young poultry, hung out the clothes in winter, made the butter in summer for fear the spring house might be damp, in fact has not allowed the winds of heaven to visit her roughly—on calm days.

It seems as if married women forget their blessings, and think because they have been allowed to serve as candidates for the presidency, to write essays for institutes, etc., they should go to the polls and vote, attend conferences as delegates, make wills, buy and sell property of joint ownership, or have any money to call their own without asking for it.

There was once a minister called upon to preach a funeral sermon of a centenarian. His relatives desired it to be a biography, a sort of eulogy of the past life of the deceased. Being a newcomer, the clergyman went among his congregation to glean facts out of which to construct his discourse. Not finding any worthy of note, when the time came he related, one after another, the stirring events of the age in which the old man had lived. This produced a powerful effect upon his hearers, and somehow, ever after, so connected was the dead man with the incidents related at his funeral, that he was regarded as somebody wonderful, and the minister was considered highly favored to have had the opportunity to perform the last rites of so noted a personage. I am sure that community was an agricultural one; and they have been doing that thing ever since—confounding the man with his

environments. It is a good thing to have a good name; but many a man and many a name that have been looked up to in the past, had no more claim to such honor than had the centenarian whose funeral sermon was all that made him famous. Farmers have seen a certain other class interpreting what that called equity; have looked in and sometimes been the fly that has walked into these law parlors, where ponderous volumes, in formidable array, met the eye; have found, by experience, how costly was the information obtained from these books; and, being deeply impressed by this legal atmosphere, have come to the conclusion that law and justice were meat and drink, air and sunshine, to every member of the bar. And so strange are the workings of the human mind, when any one is wanted to attend to their interests in the halls of the nation, instead of enquiring among those who know best—as to this man's capabilities, whether he has a correct idea of what we, as an agricultural community, need in the way of legislation; whether he has been just in his dealings with his fellow citizens, economical in the use of his own money, successful in the management of his own affairs, and thoughtful and unselfish in promoting the good of his neighbors—rather have they not relied upon the old tradition, reasoning somewhat thus: Daniel Webster was a great statesman. Daniel Webster was a lawyer; therefore all lawyers are great statesmen.

When books were scarce and schools expensive luxuries, some excuse could be made for a sparsely-settled community relying solely on what the stump orator or the county editor told them; but in this age there is no apology for persons possessed of any brains not using them in doing their own thinking and their own talking. In this latter particular the farmers' clubs and farmers' institutes are being good educators. And we doubt not in the future, as this friendly spirit which they have engendered is cultivated, as we learn to know each other better and respect each other more, we will think less about ourselves, about our possible or probable blunders in expression, and what others may say of them—for these have produced great defects in speech—and will feel that the spirit of criticism is not among us, but a desire for the good one of another.

One thing that has added to our discomfort, and we think should be classed among the ailments, is the spirit of fault-finding. Why do we hear so often the expression, "Farming don't pay?" It must be the standard is lowered; the material out of which farmers are made has degenerated; for we hold there is more in the individual than in the business. If some were given but a cobbler's bench and tools they would soon have a shoe store, and a little later on a factory; while other poor creatures would never have money enough to pay for a side of leather until the shoes were sold that had been made out of it. Too many sons have left the farm and their places been supplied by those who take no interest in the business, composed, as they are, of what we might call the driftwood of life. In all occupations or professions, an inherited one stands the best chance of succeeding. Not only can the training be begun early and the oversight of the parent be given, but there is such a thing as inherited ability, and though, in this country, it has not been necessary for every family in the struggle for a good living to avail itself of the advantages which an inherited aptitude gives, as population grows, as industries become more refined and more subdivided, the same forces which have produced the transmission of occupation in Europe and Asia will produce it here. The fear of keeping a boy from his peculiar groove in life, of stunting his proper

growth, has kept many a parent from that intelligent affectionate pruning which might have resulted in best good for both. Or perhaps it has been indifference to the son's welfare that has compelled the boy to leave the farm. The father, thinking he could get along—having learned to make his wants few—REFUSES to engage in any of those new departures the times seem to have compelled. He does not consider what new life, young brain, and muscle can infuse into the old time-honored calling; that something can, and must, be done beside the raising of those cereals, where the demand does not equal the supply. Gladstone, in a speech to the Scotch farmers, advised them to make jam to supply the city markets. The Scotch editors made great sport of what they called his kitchen gardening; but the farmers availed themselves of this idea and found the business very profitable. The Burpee seed farm is another example of what enterprise and industry can accomplish.

It is not altogether the fault of the father that new branches do not shoot out from the old tree. The women of the home are sometimes not willing to do their part of the work that may result in the family prosperity and in the keeping of the family together. They are imbued with the idea that in genteel farming the work hands should be boarded out of the house; that their mending and washing must be taken to some woman in the neighborhood—who, perhaps, does not know how to properly patch the clothes of husband and children, they are not willing that those who are helping them turn the wheel of fortune should have the advantage of their well cooked healthful victuals and refined table manners, forgetting "that even as ye have done it unto the least of these my brethren." Yet these same wives and daughters would think it quite the thing to patch old clothes and send them to the colored people of the south, or to the different missions, both home and foreign; to gather the ragged and neglected children of a neighborhood, and teach them the beauties of refinement and morality; to give of their time and talent to convert the heathen of a distant land, but this duty which is so near them is not taken up. In farm work especially, there must be coöperation. Indoors and outdoors must be alike willing and interested. When one branch is for curtailing in every possible way to make less work or to live in a more stylish manner, the other has not much chance for development.

Health is the greatest treasure mankind can possess, but there seems to be such different times and kinds of health. Some are so miserable in the morning; they are unable to be out of bed when the rest of the family take breakfast. By noon they can just crawl; but when evening comes, if it is sleighing time or a party in prospect, they have entirely recovered; whose olfactory nerves are so sensitive they cannot help with the cooking, the rendering of the lard or the making of the soap; but who can endure the fumes of tobacco, or some of those vile extracts, without a murmur. Others who can ride a bicycle all day and not be tired in the least, but to follow the plow half that time would entirely disable them; who would be sure to suffer from sunstroke if employed in the harvest, but who never get warm on the baseball field.

Do not think we do not believe in pleasure, for we do; but we are also of the opinion that our physical ailments are often but the children of our mental tendencies; that what we wish to do, that we are generally able to do. We are glad to live in an age that regards physical training as an important factor in a perfect education. But it seems

to us that an advanced step will be taken when hardness of muscle obtained by useful service will be more honorable than that produced merely by what is called athletics. Then the tan, air and sunshine spread upon healthy happy faces found in harvest field, garden, or door yard, will be as desirable a cosmetic as that fashionable brown sought for by our city cousins, in row boat, tennis court or along the seashore, and of which they are so proud. A person that is healthy morally and bodily, that has not had his religious nature tainted by false doctrines, his intelligence diseased by too much cramming and too little digesting his sympathies blunted by too much luxury, has the best possibilities of life before him. Success lies not without it is evolved from within. A mustard seed will not produce an oak, although every other condition of nature seems favorable. True, some acorns have been so trodden upon, so much the sport of wind and weather, they did not expand to that noble growth which is the *true* proportion of the sturdy oak. This is eminently true of that oak among the avocations of life—agriculture. It has not brought forth that luxuriance that affords shelter to the weary laborer; but we trust these hindering things—whatever they may be—will be speedily removed; that trunk and branches which now look so bare and lifeless are not dead nor diseased, are resting, waiting for the springtime.

DAIRYING.

By B. LUTHER SHIMER.

(Read at Bath Institute.)

One of the principle branches of farming in the United States to-day, is dairying; and as the population of the country increases, and there is a greater demand for the products of the dairy, farmers have begun to turn their business in that direction to supply the demand.

An American analyst, in the American Dairyman of October, 1890, says: "That there are \$2,000,500,000 invested in the dairy business of the country. It requires 15,000,000 cows to supply the demand of milk and its products in the United States. To feed these cows 60,000,000 acres of land are under cultivation. The agricultural and dairy machinery and implements are worth \$200,000,000. The men employed in the business number 750,000, and the horses over 1,000,000. The cows and horses consume annually 30,000,000 tons of hay, and nearly 90,000,000 bushels of corn meal, about the same amount of oatmeal, 275,000,000 bushels of oats, 2,000,000 bushels of bran, and 30,000,000 bushels of corn, to say nothing of the brewery grains, sprouts, and other questionable feed of various kinds that are used to a great extent."

These figures go to show that dairying has come to be the most valuable business, and we should look into the various points which constitute it.

The farm must be such as to grow a large variety of crops, and be made exceedingly productive by the large amount of manure he may make and gather. If the product is to be milk, the situation should be near a good market. But if it is to be butter, there is no need of

such a situation, for the cost of the farm a distance from market is not so great; and the product can be made cheaper, and easily transported to market.

All the food should be grown on the farm, at least the fodder. The grain food can be bought and transported more easy.

The building should be so arranged as to give ample room for the dairy, the storing of fodder, and both the liquid and solid manure. The feeding and watering of stock and manuring of the stable should all be made easy and economical. The stable should be warm, with plenty of light and good ventilation, so that in winter the stock may be comfortably stabled and not left on the barn yard to chill and help themselves.

Food. Too much care cannot be exercised in the kind and amount of food given to cattle. Each dairyman should experiment, and keep an account of the cost and amount of the various kinds of food he feeds to each cow. Then, by watching the amount and quality of the milk she gives, he will soon be able to tell what kind and how much food she is able to digest with profit.

The cow is our machine that converts food into milk. She may be compared to a threshing machine, engine or treading power. The price of these machines are determined by the amount of work they are able to perform. The same with the cow. Her value should be determined by the amount of milk she produces from a given amount of food with the most profit. To feed this cow, food should not only be given her to sustain her body naturally, but as much more, that she will convert into milk with profit. It is the extra food after the support of the animal, that makes the profit, for example, if we have an engine, and just feed it enough coal so that it will be set in motion and kept there, we cannot attach any machine to it and get any benefit from it, and all the time it is consuming the fuel and wasting it. But now, if we add a little more fuel and cause the engine to run faster, we can attach a machine, and thereby obtain some benefit; and the fuel is not wasted but brings in some return. So with the cow; too many in this county are just fed enough so that they can live, and are every day a loss to her owner. If she would be fed some extra food, she would, perhaps, be a profit to her owner. If she would not gain with proper food and care, she should be at once discarded from the herd.

A poor cow, like a poor machine, is not worth more than what she can be made into at once with the axe.

This machine of a cow that I have aimed for, and that do the best in my herd, are those that have light front quarters, large and broad hind quarters; giving her the general appearance of a wedge, both horizontally and vertically. The udder should have a long and broad attachment, running well up behind, not fleshy, but of an elastic, fine quality, with four good-sized teats squarely placed. The milk vein should be long and knotted. A clearly cut head with prominent bright eyes, and fine horns. A thin long tail, an open twist and a good sized round barrel, with well spring flat ribs, covered with a mellow elastic skin, with soft silky hair, is important.

But where is this cow to be found? Must she be black or white; a Holstein, Dutch Belted, Jersey or some other breed? Not necessarily. The color or breed of the cow does not determine her value. The color of a fine Holstein is black and white; now if we could change this color to a dark red and white we would have a fine animal, which could be passed as an Ayrshire. It is the true dairy qualities that are wanted,

for there are many of the so-called thoroughbreds that don't pay for their keep. The best way to get good animals is to raise calves from cows that are known to be good producers, and then breed them to some bull whose ancestors are also known to be good, and not to any scrub bull bought from some drove. It would be much better for this county if these bulls had seen the butcher's block when one month old.

Milking should be done regularly; the same time in the evening as it was done in the morning, so that the machine has equal periods between the milkings to fill her udder. The udder, before milking, should be washed and then dried with a cloth, and steadily and quickly milked clean with dry hands. The milk is then weighed and the amount recorded on a paper placed handy for the purpose. This record tells how much the cow is giving every day, every month, and the whole year.

Each cow has a card tacked up at her place, telling the feeder how much grain she is to get. This amount can be increased or diminished, and the record will soon tell him which will pay him the best.

The milk record also tells whether the cow is sick, ill-treated and misused, or not fed or watered properly. The record is very important and should be watched closely, for it tells the business of each machine. After the cow is milked and recorded, the milk is not left in the stable to absorb the foul odors, but I have an arrangement by which it is passed directly out into the fresh, sweet air, where it is strained, aerated and cooled automatically. A great saving of time and labor.

The arrangement is composed of a small strainer, a funnel three and one-half feet long; a pail, which, one-half inch from the bottom edge, has a circle of small holes, one-sixth of an inch in diameter; a large pan three and one-half by six feet; a straining cloth and a ten gallon can. The funnel leads from the stable, through a hole in the window, out into the fresh air. The inside end of the funnel is fixed to hold the strainer, into which the milk is poured, which then passes through the funnel into the pail. As soon as the milk comes into this pail, it squirts out of the small holes, each stream passing through the air, a space of about two feet, when it is collected by a slightly slanted pan, and then conducted into the ten gallon can, which is covered over with a fine muslin cloth to strain it the second time.

The results of this system are:

1st. The milk being passed out of the stable through the funnel as soon as milked, prevents it from absorbing any foul gases that may be in the stable.

2d. It aerates each cow's milk in three minutes after she is milked, which expels the animal heat, noxious and volatile gases contained in the milk (which cause it to spoil) and preserves the milk sweet much longer.

3d. The milk is not chilled by this arrangement, but as it passes over the large surface of the pan, it cools gradually. Milk chilled, causes the gases to be retained in the milk, and when it gets warm the gases react and rapid fermentation soon spoils the milk.

4th. The cost of the apparatus is low compared with some of the patented aerators, which sell from thirty-five to fifty dollars.

5th. Being that this apparatus works for itself, there is a great saving of time and labor.

After the milking is finished, the milk is taken into the milk room and then bottled and put into boxes ready for the milk deliverer.

Milk delivered in this form keeps much longer and is cleaner, being

bottled on the farm, no dust or drip from the hands while tapping on the street comes into the milk. There is no churning of the milk in the bottles, and these bottles, being clear and white, it shows the color of the milk, which is a guarantee of its richness. In this system the last customer gets an article of the same quality as the first.

The cows should not be beaten, whipped or worried by dogs and small boys, but the attendants should pet and treat them kindly, teaching them that they are their friend, but still their master. The dairyman should keep his dairy working the whole year, not only six months; for there are few men, having occupations that can live twelve months and work only six. Some of our grain farmers are an example of this, and you find this class live the poorest.

A strict business account should be kept of every detail; then by studying it, and watching other dairies, by reading the dairy papers and experiment station reports (which every farmer has a privilege of getting simply for the asking) many points may be learned and gained.

Every utensil used in the handling of milk must be kept sweet and clean.

In fact, all through the business, from the preparing of the ground, the growing of the crop and feeding thereof, the judgment, buying and handling of cattle, and the marketing of the finished product, should be studied and systematized in order to make dairying a success.

THE PROPER EDUCATION FOR FARMERS' BOYS.

By JAMES L. BRANSON, *Langhorne, Pa.*

(Read at Atglen Institute.)

Let me start out by asking this question: What is a good education? The modern cry is educate! educate! But what instruction shall we give to our children? Must all children be drilled in the same routine of studies, learn the same things, regardless of the future of the boy or girl? Must the lad who has fixed in his mind to be a physician be taught the same things as the one who purposes to be a mechanic? Has the future of the boy nothing to do with the things he ought to learn? Has the boy's adaptation to a particular pursuit in life, nothing to do in the matter of his education? If we answer that a good education is that which fits us for the peculiar duties which devolve upon us through life, then the boy must be educated in the direction of those duties. If it is intended that he shall be a merchant, educate him in the things that will benefit him in the pursuit of mercantile duties, or in the pursuit of any other occupation that is selected. We often hear parents say, "we will have no money to leave our son, and we will do the next best thing, give him a good education, which shall be his capital to start life with." But whatever of that education is not available in the business or profession in which he engages, is so much dead capital, and precious time lost too, because no fixed purpose was in view in giving him his education.

It is true certain elementary things may be taught all children in common, but to continue to thus educate on and on, the whole mass,

not looking at the differing duties that will devolve upon them through life, is in many cases a waste of educational capital, and the time and strength of his young life. The best and most economical education you can give a boy, is the one which most specifically fits him for the occupation and duties in which his life is to be spent. And I hold that the father and mother, who wisely look to the future of their boy, may, in educating him, so direct the current of his life, as to form a channel out of which he will rarely pass. Indeed, how many fathers and mothers have thus turned the course of their boy's life towards the great city, and the strife and turmoil of trade, where, amid the rush and roar of the torrent of human selfishness and greed, they are wrecked, and go down to be seen no more. They were made to believe that to educate the boy was to unfit him for the duties of the farm; and the drudgery of farm work was a calling too low for an educated young man, and he must go to the city to make available his educational capital. What a shameful thing it is that such a thought as this should have ever gained a lodgement in the minds of the people. The truth is, that there is no business in which a man can engage that requires more skill and forethought, riper mental powers, more varied and thorough education, than farming. I want to say, that it is a shame that farmers themselves should encourage the sentiment that education unfits the boy for farm life. The ignorant boor may be a sort of farm hand, but never a farmer. Do you think your boy will stay on the farm when you thus decry and slur it? Farming is the most exalted and refining of all occupations. There is no business in which you can engage where knowledge can be so profitably employed. I need not mention those branches which are called elementary in the education of the boy; but chemistry, in the analysis of food and soils; botany, in the knowledge of grain and plant and flower; anatomy and physiology, in the knowledge of the structure and uses of the parts of the bodies of farm animals; medicine, in the treatment of diseases; mechanics, in the care and use of farm machinery. These and many other things enter into the proper education of the boy if you design him to be a real farmer. No business can be made to pay unless you bring into it the knowledge requisite to carry it on; and to make your boy a successful farmer, you must make him an educated one. I repudiate the idea that the dumb-headed boy of the family must be made the farmer, and the bright lad sent to school to be educated for professional or mercantile pursuits. It takes more genuine practical skill to be a farmer than either merchant, physician or lawyer. And one of the reasons, and I think the paramount one, why farming is not more successful, and does not pay better, is the lack of the knowledge requisite to successful farming. And it is the imperative duty of every farmer, to show his boy how the education he is acquiring can be applied and brought into use in the business of the farm. He should be shown that it is not true that his educational capital can only be made available in the city, but the broader and deeper his knowledge, the more varied and extensive his acquirements, the happier and more successful he will be on the farm. Here he will find the imagery that is the inspiration of the poet; here he can see the wisdom of the Creator in the skill and design shown in the beauty and harmony of His works, and His power in their greatness and grandeur. These are some of the moral lessons the farmer's boy should be taught, which will be as a hedge around about him, preserving him from the insidious seductions of sin and crime.

And another and most important lesson he should be taught, is economy. He should be taught not only how to make, but how to save money. Give your boy something that will be his own, a pig, a calf or a colt, and teach him how to feed it so there may be a profit derived from it over and above the expense of raising, and when it is sold, counsel him as to the investment of the money in something that is connected with the farm, and tax his skill to make the original capital accumulate. In this way you identify him in his lessons with the farm and lay the foundation on his future prosperity. Mere theory is the wind work of life, whilst practice is the building of the structure out of the material we gather by the way. This is an age of extravagance and pleasure seeking, and no lesson is more imperative than economy. For economy is a child of habit, but extravagance grows without culture or encouragement. Economy leads up the acclivity to the high lands of health and wealth; but extravagance down the incline to poverty and death. This teaching of the child financial management and economy, is often overlooked by parents. How can you expect your children to understand the details of business in which they are taught neither theory or practice. It is too often the boy leaves home without a single lesson in financial economy. They start out like the infant learning to walk, without a helping hand, stumble and fall, get up and try again, and only through repeated failures finally succeed in maintaining their feet. These first lessons he should have had at home, and many a father will find in teaching his boy, that he is himself benefited almost as much as his son. Economy in farming covers a vast field; it relates to the plowing of the soil, when and how; the sowing of the seed, in kind and quantity; the care of crops, the time and manner of cutting, so as to preserve the nutriment; the best way to maintain the productiveness of the land, involving the whole question of manures, and many other things which cannot even be referred to now. But from this the importance of this line of education I think will not fail to be impressed upon your minds.

We must do all we can to keep the boys upon the farm, and not by continually growling at the drudgery of farm work, as compared with the false and fictitious ease and luxury of city existence, make him dissatisfied with it. For all this is an illusion and a snare. Would you change that ruddy rosy-cheeked rollicking boy, for the pale faced city lad? Would you send him to the city to spend the hours he now spends in the sleep which brings health and vigor for the morrow, to make the rounds of gilded dens, where he inhales the poison of moral and physical death? Surely a false ambition for your son will not blind your love like this. Because your boy is not strong is the very reason why he should remain on the farm where he can gain health and strength. What folly to imagine he will be better off amid the pestilential odors of the sewered city, than breathing the salubrious air of the country. Educate him for the farm, and the more liberally you educate him the better; but educate *towards* the farm and not away *from* it. We must cease to give out the false impression that education unfits a man for farm life, for it is not true, but the very reverse of the truth. The real reason that farming has not been as successful of late years as it should have been, is that the acquirements for it, in an educational way, have not kept pace with the times. We may change all this by educating our boys, so that skill as well as labor will be an element in our farm industry. Farming can utilize a wider range of knowledge than any other occupation. Educate your

boy, therefore, in every branch of practical knowledge, and show him how to utilize this knowledge upon the farm, and we will thus elevate farming and agriculture to the place they should occupy, as the highest and noblest of all callings.

WINTERING STOCK WITH ECONOMY AND PROFIT.

By. H. W. NORTHUP, *Glenburn, Pa.*

(Read at Millville Institute)

The most successful agriculturists in northeastern Pennsylvania at the present day, are those who are engaged largely in the keeping of farm animals. There are a large number, at the same time, keeping them, undoubtedly, at a very small profit. The farmer, in many instances, considers the keeping of these animals almost a necessity. It is very little pleasure for him to do so, but the requirements of the exhaustive nature of his soil demands something on his part, and he retains them on the premises, hoping that in the near future something may occur in which he may be able to realize greater profits. The man, in this day and age of the world, who is just waiting for something favorable to turn up, will ordinarily never succeed. Waiting for a more favorable condition of things in the farmers' business does not answer. He is to do the best he can under the circumstances. The wintering of stock is an important period. It is a well-known fact they are far better prepared at other times to take care of themselves. If the animals are in a healthy condition and have been furnished a sufficient amount of pasture and pure water during the former seasons, they will go into winter quarters in fine condition; and it is very desirable indeed that they should do so. It is a part of animal nature when the weather becomes cooler in early autumn for the appetite to increase, and consequently flesh will be taken on rapidly, as a needful preparation for the natural severity of winter. Considering the low price of beef, its cheap and quick transportation from our western fertile fields, and the high price with us of grain products, we cannot think of making it very profitable for us to winter-feed farm animals, with a view of making and selling that article. The day for doing that with us has passed away, and a different theory must be presented, in order to allow us any reasonable profit. One farmer, to my knowledge, has been keeping and feeding young stock from year to year, until last autumn, when they were nearly four years old, with a view of getting better prices. The better prices did not come, and they were undoubtedly sold at a sacrifice. We cannot encourage this kind of management in general, for it is ruinous. The farmer is indeed a willing worker, but he is entitled to some compensation for his services. The question then arises, what kind of stock shall we winter, in order to expect a reasonable profit? We are all differently located. Some of us are near the market; others are remote. Some of us are keeping sheep; others are devoting their time and energies to the dairy cow. Some are producing and selling milk; others are manufacturing and selling butter. Some are handling one breed of cattle, and their aspiring neighbors have another. Some are breeding farm

horses; others are turning their attention to fine young roadsters. So this matter must be decided by the individual farmer. The great and important question with each of us is, to know how these shall be wintered in an economical and profitable manner. We will now consider some of the methods.

The first consideration is a warm and comfortable stable. This can be furnished at moderate expense, and is far more economical than to allow the animals to suffer with exposure. The material and labor in the cost of construction is a small item, in comparison with the amount of extra food consumed as fuel to keep up bodily heat, and cause a free circulation of the blood to support animal life. About two-thirds of the amount of food assimilated goes for that special purpose. Proper ventilation in the stable is as essential to the health and vigor of the animal as it is to shield them from the cold. No foul odors should there exist. Absorbents, such as saw-dust, pulverized muck with fine litter, and good ventilators, will remove these obstacles, and make the place desirable and inviting. Sudden changes in the atmosphere affect the condition of things, and should receive careful attention in regulating the ventilators. The kind of food provided for the animals has much to do in increasing the profits. The early cut hay is taken by the animals with far greater relish, and with the clover this especially so. It is one of the best gifts to man, and is in itself nearly a balanced food ration.

As we come to the consideration of food, we will take that class of animals that are kept the most extensively among our farmers, namely, the dairy cow. Perhaps there is no animal given to man that, many times, is more generally neglected, than the cow. She is an animal that requires constant care and attention on the part of the owner, if he desires to reap the full profits of reward, by the wonderful transformation of her subsistence into the production of milk and butter. How to feed her in order to get the most satisfactory results and retain her bodily health, requires some knowledge of the amount of food she is able to assimilate as an individual cow. It does not require any very great skill for the intelligent farmer soon to ascertain about the amount of food his cow will eat, and that there is a very great difference in this respect among those in his stable. Those that produce the most will usually consume the most to do it. To feed the cow a large amount when she is unable to use it, is merely ruining her appetite and wasting extra food. The question of size comes into consideration, and should not be disregarded. Practical results have fully decided that certain qualities of food, or food elements, known as albuminoids, carbo-hydrates and fat, are essential to the animal support, and also to the production of milk. In order to feed with economy and the greatest profit, it becomes necessary for us to ascertain, in some way, the amount of these elements our food contains, in order to feed what is called a balanced food ration. The average farmer is not a chemist, and is not expected to be. To acquire this knowledge, it is only necessary to obtain a table of the analysis of different kinds of food, and then for the farmer to apply this to his food supply, and mix, so as to balance the ration. What we mean by this is, that it shall contain, when mixed together and fed to a cow, albuminoids in proportion to the carbo-hydrates, as one to five, or five times as much of the latter as of the former, and about sixty one-hundredths fat. The theoretical standard for the largest cows is three and seventy-five one-hundredth pounds albuminoids, eighteen and seventy-five one-hun-

dredths pounds carbo-hydrates, and sixty one hundredth pounds fat. If milk is desired, carbonaceous and nitrogenous food will be required; and if butter, then feed food that is rich in fat. There is no one food excepting grasses, and especially clover, that is properly balanced, and the best combination of food for the farmer will depend upon the cost of the article.

The corn crop is the farmers best production. It is the best and cheapest food for animals he can produce. Even without a silo, there is no crop that will produce as much milk or butter per acre as corn. The silo, however, is the proper place to preserve and store this excellent food. Every year finds a large increase in their number; and in my judgment the time is not distant when nearly every farmer will depend upon them to furnish succulent food for his dairy. It enables the farmer to keep more cows on the same acreage than in any other way; hence it is the most economical and practical method he can adopt. It takes the place of growing and feeding roots, and with the addition of a little nitrogenous food, like wheat bran or cottonseed meal, it forms a balanced food ration and accomplishes all that is desired. See to it that the cow does not suffer a shrinkage in her milk until you wish her to go dry, which should be about four weeks or nearly, as a rest from her services.

Farmers never get richly paid for keeping a boarding stable for dry cows. It is considered expensive business. Beside proper food, the cow needs a sufficient quantity of pure water to drink, and should not be forced off to a distant brook, through the cold, to receive it. It is said that the quantity of milk produced by a cow is proportionate to the amount of water she drinks; and that is one reason why succulent food produces the most milk. There is another consideration that effects the profits of the cow, and that is, the treatment she receives. If she is treated with gentleness and kindness, the farmer's reward will be a bountiful supply of her products. On the contrary, if she is abused she has the power to withhold, and in every instance she is apt to do so. What is true in regard to the care and special attention of the cow, is also true in regard to all the farm animals. They need comfortable shelter, regularity in feeding and a general oversight in keeping them from suffering harm.

It always costs more to replace a pound of flesh than it does to retain it upon the animal. It is far more economical to keep them thriving and in a healthy condition. On the principle that what is worth doing at all is worth doing well, will apply to the farmer in the wintering of his stock. If it is done with economy, which is necessary for profit, he has become master of the situation and will be pleased with his business.

WINTER DAIRYING AND SILOS.

By A. L. WALES, *Corry, Pa.*

(Read at Union City Institute.)

The subject of winter dairying is demanding more attention from progressive dairyman as each year shows the need of some change from the old methods to something that will return a profit. That the old method of six months' summer dairying with a cow that will not yield milk a much longer period is a losing business needs no reassertion to-day, yet there are a great many ifs and ands to consider before embarking in this winter's job. The first and most important factor in this business, as with all others, is the man. It is a business that will not run itself, neither is controlled by luck or chance, weather or the moon; it must be intelligently conducted in every particular, or the returns or profits will go to the grain dealer. We will not attempt here to discuss the merits of the different breeds of cows or the one in our opinion is the best for the purpose, but whatever we have, do the best we can with until we can improve them. And I think the most of our herds of native or grade cows would surprise their owners if given the care and ration that fall to the lot of the thoroughbred herds. A cow will give more milk in a year and a better calf can be raised to come in October than one in the spring. But the first thing to do is to fix up the old stable so that it will be warm, I mean so warm that it will not freeze, in fact it is absolutely necessary to get the best results. You may say you do not believe it can be done in most barns, well I admit there would be some bad cases to attempt, but it can be done and not cost very much either. Then they must have easy access to water, not ice water either, although I am not convinced that it pays to artificially warm water, if good well or spring water is convenient; but I protest against the methods of a great many in fact I used to do it myself, that is compelling stock to go a long distance down the old lane, either full of snow or covered with frozen hubs, to get water at the creek, generally frozen over; this would never do for winter milkers. And next the feed which must be not only liberal but of different varieties, as each must determine for himself, will produce best results, and here is where the silo shows to its best advantage, in fact it is one of the best feeds for milk cows that can be grown, but do not think success is assured where you have a silo and filled, as nothing is added to the feeding value of the corn, it is simply the best and cheapest way of getting the feeding value from a crop of corn. A liberal grain ration is necessary for milch cows in connection, with silage, and I prefer a good proportion of that to be yellow corn meal. Now to succeed you must be able to make good butter and here is where there is more self-conceit shown and unwillingness to learn than any other part of the business.

We are very likely to think and perhaps say well! we, (they mean their wife, can make just as good butter as they can with their creamer, barrel churn, thermometer, etc., and we use the small pans set in the pantry and a dash churn that mother gave us when we set up house keeping, and as for a thermometer. I would not take one as a gift, as I can tell well enough with my finger. Now that sort of disposition will never succeed. We must ever be on the lookout for the best way and ever ready to learn from any and every source, anything that will

help us to do better. It is the gilt-edge goods that bring the top prices and none should be content until the top is reached. And when you know you have succeeded in producing a fine article, find a customer that is willing to pay for it, put it in such shape and packages as will suit him and he is willing to pay for. Do not put it up in the shoe box style wrapped in a piece of old muslin of questionable pedigree that nobody wants, and take it to the grocery and trade for cod fish, etc. Nor do I advise selling good goods to our local buyers, who has one price for all, thereby encourageing the poor butter. As the few lots of prime butter goes into the consumers' hands that you should find and gain the premium.

I would advise a trade at a fixed price for the year, as good butter sells almost anywhere during the winter when it cost the most to produce. Have or send a sample of your goods and try and have one-half the say as to what you shall receive for it. Our present ways of selling our produce is all wrong, the merchants set the price for both parties and we quietly submit.

There is volumes that might be said on this subject by one competent, but there is only one more point that I will dwell on as being essential to success the neglect of which would be ruinous to the whole business, and that is cleanliness. Why! Professor Gilbert, gives a whole lecture on this one subject, and it would be tiresome now to enumerate all the different opportunities for labor on this point, it is as essential as the cow herself, it must be observed from first to last.

This much I will say and that is that no man thoroughly fumigated and smoked like a ham with tobacco is unfit to even milk a cow much less make butter.

CHESTNUT CULTURE.

By WM. H. BRINTON, *Parry P. O., N. J.*

(Read at the Atglen Institute.)

Chestnut culture is an industry that has but of late years received little or no attention, as to this neighborhood there is nothing but a few old trees that have been spared by the woodman, scattered about our farms and an occasional one in our forests that yield forth their shining brown nuts every autumn, mostly left for the children as their perquisite which at times would amount into dollars worth from single trees. This, compared with what is being done and what will be done in the future will, make one of the greatest eras in horticultural advancement. And the chestnut will take no small place on the horticultural table, as one of the most profitable fruits.

Now, in order to substantiate the above assertions I will state that having had frequent occasions to attend the market places of the city of Philadelphia, I have been surprised to find the enormous high prices of chestnuts, wholesaling from five to ten dollars per bushel, and I learn from men that have been attending the same markets longer than I, that the prices with the demand is advancing, what is more, all the chestnuts that are sold in our markets after the month of October are of foreign production, principally from Italy and Spain, at the price of five dollars per bushel and upwards, and are all of rather poor quality,

much poorer than those of home raising, even those from foreign varieties.

We already have evidences of what planting of improved and foreign nuts and trees has done here. When the DuPonts came from France to this country and settled on the Brandywine, they planted quantities of choice European nuts, and soon had fine bearing groves of great value. And at different times the surrounding farmers planted nuts from the best of these trees in the DuPonts groves, and from these plantings obtained several new seedlings, from which have been propagated and planted many trees of great nuts, as well as money-producing value, and the farmers of that section are now reaping the profits, coming into Philadelphia markets once and twice a week for several weeks, in the fall of the year, with an ordinary-sized bag of chestnuts on their usual two horse load of other farm produce, which is of times very bulky and weighty, and will receive in return as much money for their bag of nuts as all the rest of their marketing.

Other proofs of the profits and benefits of planting improved and foreign nuts and trees, are the results that have been obtained by some of our most reliable fruit growers, who have already emerged into this industry and have been very pleasingly surprised, of which one is Henry C. Comfort, of Fallsington, Pennsylvania, an energetic farmer and fruit grower, and one who has obtained excellent results from having planted one acre of Numbo chestnut trees (a variety which we do not consider the most profitable), about eight years ago. He commenced two years ago to gather remunerative crops and they are on the increase each year and he considers that this acre will in a few years be the most profitable acre of fruit he has, Kieffer pears excepted, and several other growers are giving similar results. In fact I gathered this last season with my own hands for the firm with whom I am employed, quarts of large brown nuts, from some of our best seedlings and grafted varieties, not over fifteen feet in height, many of them, I could reach the top of the trees while standing on the ground, some of the smaller trees producing two and three quarts per tree, and sold the same at the rate of fifty cents per quart.

Varieties of chestnuts have already become numerous and, like other fruits, are a great many not worthy of cultivation, some more desirable than others and some I suppose better adapted to some localities, but as a general thing most thrive where the chestnut grows naturally and there is also a wide difference in their characteristics, for instance, the Japan Mammoth, which are seedlings from large selected nuts imported from Japan, from which a great many of our best and most profitable varieties have been selected, such as the Early Prolific, E. Reliance, Advance and Success, all very productive and valuable nuts, very large, bright and free from fuzz, which is often seen on chestnuts and very objectionable to their selling qualities; trees, vigorous growers and early bearers, producing three and four quarts of nuts at three and four years of age; there are Japan Giants, Parry's Japan Giant, Paragon and Numbo, all either of Japan or European varieties, or seedlings of the same, and also many other varieties, some of redeeming qualities too numerous on this list. Japan Giant is an imported variety and is not always reliable, either in size of nut or growth of tree, but there have been some trees of most excellent redeeming qualities of which Parry's Japan Giant is one, this variety is paramount to all others, in most all respects, being the largest in size of nut, good color, free from fuzz; the tree a good grower, with compact head,

bright foliage, very ornamental, commencing to bear early and continue to increase in bearing. Paragon and Numbo are nuts of medium size and good color. The trees come into bearing early and are good growers.

In selecting varieties for the most profit, two things are important; first choose those earliest in the season to ripen, before the market becomes too much filled up, and, secondly, those that bear nuts that are large, bright in color and free from fuzz or wooly coating. The Advance and Early Prolific being the earliest varieties now known, are very profitable to plant, but Parry's Japan Giant, being much superior in size and appearance, and ripens so short a time after the Advance and Early Prolific that it rates first, on the list in this respect. The Mammoth is also very profitable, being a very large and fine looking nut, coming into profit early and ripening in good season. The above named varieties ripen from September 15. to October 1, which is early for chestnuts.

In planting a chestnut grove or orchard select a soil upon which the natural tree grows luxuriantly, or a soil that is loose and open with the heavy clayey subsoil or solid rock is some distance below the surface, as it does best where there is good drainage.

The chestnut is a tree rather more difficult to transplant than a pear or apple, and care should be taken not to let the roots once dry out, or the tree will surely die.*

The ground around the trees should never be allowed to become dry for the first season after planting. The best and cheapest method of remedying this difficulty, is by mulching with litter or coarse stable manure; but where you have invested in high priced varieties, such as cost from one dollar to three dollars per tree, the time in watering during dry spells would be well spent.

The mode and plan of planting a grove may be left somewhat to the pleasure of the planter, the Japan varieties, which are rather dwarf in their nature, are mostly planted from twenty to twenty-five feet apart, and European and American varieties, forty to fifty feet, the space between can be utilized in growing other fruits, vegetables or any farm crops, which will at most times pay all expenses of attention and fertilizing. There is another way of obtaining a grove that is by selecting a plot of ground that is already set naturally with chestnuts, from two to ten years old, being the most desirable size, thin out under brush and undesirable trees, cutting the others back to about where they are from one to two inches in diameter, and insert grafts of the varieties desired. This can be done by an ordinary grafter at a very moderate expense. Always insert about three times as many grafts as you expect to grow as thirty-three and one third per cent. is a good take in chestnuts. This plan is fast coming into favor, for two reasons, first, that the tree can be got into bearing earlier; secondly, that the land of this description can be had at very reasonable rates, as chestnut sprout land has become a very poor investment.

Nurserymen as a general thing have not their stock of chestnut trees very well established as yet, and the proper varieties cannot always be had, but when this is overcome, there is but one drawback, that I have already spoken of, is that this tree is one that is somewhat

*NOTE.—The difficulty of transplanting is overcome by having the trees twice transplanted in the nursery rows before sending out, which gives them fibrous roots instead of a tap root. Many nurserymen are adopting this plan.

difficult to transplant, but as it requires so little attention after once established, and will yield large crops with absolutely no fertilizing or cultivation that it well repays for the extra care and expense of starting. For an orchard of one acre which will contain about one hundred trees of the Japan strain, once set will at four years of age yield about four quarts of nuts per tree, and seven years about eight quarts, and will at least double the quantity every three years, at twenty-five cents, per quart, which would be a fair average price would be one dollar per tree, or one hundred dollars per acre, at fourth year of age; or two dollars per tree, or twelve dollars per acre, at seventh year of age, and so on doubling itself every three years, for several years to come, as the allotted time for a chestnut orchard is from seventy-five to one hundred years. Or computing it at one-half this amount it makes an enormous profit compared with that of any other fruits; for instance, the strawberry which produces as many gross dollars per acre as any other fruit that is raised, after counting out the cost of manuring and constantly weeding, hoeing, and hoeing and weeding, for if you cease to cultivate and fertilize your strawberries and other fruits, your land ceases to produce anything, while that planted in chestnuts may be allowed to go down to grass and be used as a range for cows and sheep or made as the owner may desire, and the trees bear as well as ever* and all that you have to do is to go once a year harvest your nuts, ship them to market, and deposit the money in bank, ready for any use that you may desire it for.

There are but few farmers but who could find room on their land to plant at least one hundred chestnut trees along the road way, who could plant them as shade along drives or lanes or in some corner of the pasture, and the ground would never be missed, and trees once established require little or no attention, but to gather up the nuts with the product of one to two dollars per tree, or one hundred dollars to two hundred dollars or more a year would oft times come in good to many farmers in the month of October.

Now you may think that I have used considerable flattery upon this subject, but I have by no means exaggerated any of my figures and can furnish evidences of proof for any statement made in this article. And in conclusion I will say that a chestnut grove once established and in full bearing could be laid down in pasture and would require neither cultivation, attention or manure. All that would be required would be for the owner to come once a year and take off the crop, like clipping coupons from Government bonds, the principal would be there still as good as ever, a bonanza to the owner and mine of wealth to his children and grand children after him for years to come.

*NOTE.—But for best results we recommend cultivation and fertilizing while young, the same as for pears and apples.

THE FARMER AS A CITIZEN.

By G. K. FINNEY, *Breadyville, Pa.*

(Read at Hatboro' Institute.)

Webster gives (among other meanings) the farmer as one who tills the ground for his living; and a citizen, a person born in, or has the right of elective franchises of, any country. Thus we have the farmer as a citizen, a native or naturalized tiller of the soil of any country. Now, in the hasty view we shall take of this subject, let us look back and trace, as far as we can, the farmer as a citizen. The Good Book tells us, in the beginning God created all things, and among other things, he created man; and he stopped his work and was well pleased. He placed him in a garden where he did not have to farm, he caused him to name all the beasts of the field and every living thing, and gave him power over them all. Now you will notice that all this time (and how long a time it was we know not) Adam was a bachelor; and while it started off all right at the first, like all old bachelors, he grew lonesome, and no doubt crabbed and hard to get along with, and the Lord said: "I will fashion him something he can get along with;" and you all know he fashioned him woman; and now things seem to go all right again, for a time. But it is the old story of an old bachelor, and a very young wife; after tiring herself of trying to please him she turns him over to the tender mercies of the devil; and the Lord, disgusted with them all, drives them out into the world and says, "farm for a living;" and you have before you the first farmer as a citizen. And from this it would seem that the first farmer did not take up the occupation from choice, but from compulsion; and the business of farming commenced under very much of a cloud and unfavorable circumstances.

The second farmer was a murderer, and still more is the occupation blackened. And as generation after generation passes we see but little influence arising from the farmer. The old rulers seem to have been great cattle kings. Their wealth was counted by their great herds, and their power by the number of subjects they ruled over; and thus has it always been in all old countries, and is to-day. the farmer, as a citizen, has but little influence or honor.

In the settlement of this great country of ours, it seemed as though the farmer was to have a chance, and for many years the Dutch farmers and the English farmers, and the farmers from all nations came and settled, took great tracts of land, lived, no doubt, contented lives, died, and left their plantation to their oldest son, who followed in the footsteps of his father, with no enterprise or ambition for anything outside of his acres of ground.

Being in the southern part of Virginia last November, I met an old Virginian on his own plantation. He asked me where I was from, and if I had anything to do with that new-fangled town over there—having reference to a land association that had bought a large tract of land and making great improvements,—said he wanted nothing to do with it, and thought it would not amount to much; told me he owned fifteen hundred acres of land, was owned by his father; had his own graveyard, where all his forefathers were buried, expected to be laid there himself, and wanted all his descendants buried there; wanted everybody to let him alone and he would bother no one. I thought to myself, there is a true and genuine type of an old farmer. No doubt

happy and honest, but is he a good citizen? He builds his high fence around his farm, wraps his mantle around his shoulders, goes inside and says to the world of improvements, "stay out, and I'll stay in." You say he was contented and happy; what more? I saw an old darky, with his curly hair as white as snow; he had been a slave. During his lifetime his master had made him a present of twelve acres of a miserable steep hill along New River. Iron has been discovered in this hill, and a party of iron capitalists offered him twelve thousand dollars for it—a veritable mint of money to the old darky—but he would not sell it. He said to me, "do you think I would sell what my old marser gave me?" and, by his genuine southern laugh, I knew he was contented and happy. Says some one, "that is enough." I say to be a farmer it is enough, but to be a good citizen it is not enough. This farmer will awake up some of these times to find a railroad running through his farm; improvements going on all around him; laws of his state being changed; money by the thousands being spent; and it all will not suit him; he has stayed at home, contented, too long; he has no influence or say that he might have had; he can pay his full share and more of the expenses, but someone else is bossing the job.

Our old Dutch ancestors that built Dutch lanes along the cow-paths, would never have built Broadway or Brooklyn bridge. Our good Quaker forefathers that laid out Water street in Philadelphia never dreamed there would be a necessity of a railroad there; never thought of Market street reaching beyond the Schuylkill; never dreamed of the Reading Terminal or the wants of an elevated on Market street, and safely, we think, we can say it never would have been wanted had we depended on the farmer to create the necessities for it. And why is this so? Simply because each farmer tries to be a nation to himself, not recognizing the fact that he lives in a world of nations—a nation that is improving more rapidly every year. What is done for our improvements last year will not do for this. Capital is being poured out by the millions. Trusts are being formed for everything but the farmer. If prices get too low, they are regulated to keep them to a point it pays to produce. Not so with the farmer. If they will not pay four cents for milk, he sells it for what they will pay. If he cannot get one dollar for hay, he hauls it for fifty cents. And not a particle more is consumed at the low price than if it were double. You will say the farmer cannot do it; all other branches of trade do. But two or three years ago a snow storm, in three days time, doubled the price of milk; and yet you say the farmer cannot do it. We say, be honest with yourselves; work together for the interest of the farmer; elect men to office that will represent your interest as well as they do others, and you will find you have done much to elevate the occupation of the farmer as a citizen.

In reading an extract from a speech delivered in New Hampshire but a few days ago, the speaker said if the farmers do not arouse and take care of themselves, soon they would have nothing there but fish and granite, where once was one of the most prosperous farming states of the country. Scarcely a farmer's son stays on the farm any more. Other occupations pay better and give them more influence. American farm hands, by the year, can seldom be found, and their place is filled by the foreigner. This is not as it should be. Says some one, "I don't care, farmers are honest; and that is more than you can say of the storekeepers, coal-dealers or bankers." And this, I guess, is true,

although there are a great many bags of potatoes go to market we do not see the inside of, and a great many loads of hay go down the road that would not carry so well had it been a dry time before they left home.

Many honest men there are in all callings, and the farmers have their full share; but with all the honesty, if you will be good citizens there must be something more. In the War of the Revolution our forefathers (the majority of them farmers) gave their lives and treasures, and suffered hardships untold, to give us our nation. In the War of the Rebellion the farmers were not behind any class of men in defending it; in other words you help make a machine; do your full share in helping preserve it, but refuse to help run it. You say "we think we have made a pretty good showing last fall to help run it." Of this—as there are others to follow who can discuss it much more ably than I—we will say nothing, only do not drive too fast; do not expect to do all at once. We might say, if you run it like it was in many places, what the man said when about to start with his wife's funeral, he was told he must walk with his mother-in-law, "if I must, I must; but, I want you to understand it takes all the pleasure out of it for me." Farmers, go slow; but be sure to go; go forward and not backward. Organize as other branches of industry do; don't submit to be called old hay-seeds any longer. Make your occupation what it should be, the most honored in the world. Then will your occupation prosper, and you will not only be good farmers but good citizens as farmers. This to the rich and influential farmers, we find, makes up the Horsham Farmers' Club may seem harsh. You all have your happy homes and possessions of full and plenty, but you are not quite happy in your pocket. A few years ago your homes were worth more money, and to-day we hear you complaining of hard times and low prices. While you have full and plenty think of your brother farmer who is struggling from year to year to keep his head above water and finally sinks in bankruptcy. If you would be a good citizen, come out to the help of these men.

Farmers' clubs and farmers' institutes are doing much; and too much praise cannot be given to the Solebury and Horsham farmers' clubs for the work they are doing. Would there were tenfold more of them; then could we say the farmer's day is dawning; and yet there is hope for the farmer as a citizen.

ADVANTAGES OF A CREAMERY TO THE FARMER.

By MILFORD S. RITTER, *Windsor Castle, Pa.*

(Read at Hamburg Institute.)

The benefits of associated dairying are many. It gives the farmers regularly weekly or monthly pay; and, although the amount may not be large, he has the cash to buy with instead of the barter or exchange of his butter, as was the custom years ago. This places the farmers on a better footing.

A better article of butter is made by the creameries than can be made in the old dairy way. There is a uniformity in the quality of the product that can be secured only by a uniform system.

An expert butter maker looks after all details at the factory, and is expected always to produce a first-class article. Every step is taken in the best way to succeed in keeping up the standard of the product.

This is what makes creamery butter command more per pound in the market than dairy butter. I concede at once, of course, that it takes good milk or cream to make good butter; and it is equally true that the mass of the condemned butter that goes to the grease tub in million pound lots every year was made from good milk and cream.

An experience of a good many years in presiding at the weigh can and the cheese and cream vat convinces me that the howl about factory milk being less cleanly than that made up by the average dairyman, is founded on conceit, cheek and ignorance, and the whole sometimes mingles with a selfishness that borders on meanness. Coöperative dairying for the mass has come to stay. The private dairy, for a few, has come to stay too; but those that do stay in the near future will have to do business on a scale that is equivalent to a successful factory, and will have to use the method and the tools of the modern creamery, or the owner will either work cheap or go to the wall.

Factory practice has not only raised the standard of excellence in butter, so that the private dairyman must stretch up to it to make sales at all. But hundreds and thousands find that the factory, with its weekly supply of a first-class article, has supplemented them. Other thousands will find they have to meet the inevitable, as the better way to prevail.

Factories are labor-saving and capital-saving instrumentalities, and the skilful and honest operators are benefactors—not blood suckers.

The middleman in his place, is just as useful and essential as the farmer in his place, and the consumers in their places; or, as the railway or the ocean that lies between them.

We are nearing the point every day, when there has got to be a more exact equipoise between efforts and results; and such an end forbids the useless waste of labor and the partial waste and damage of good material, in small private dairies.

One of the serious drawbacks to the making of money in dairying, is the small number of cows farmers usually keep to the number of acres of land employed for their support. We have evidence of this on every hand.

The cost of running a creamery depends, in a great measure, upon the density of the cow, the population within the working area of a creamery. The smaller the number of cows, the greater the cost per cow, and the less profit for the farmer.

It has been well said that necessity is the mother of invention. A number of times have the farmers in different sections of the country been induced to change their mode of farming, but generally not until driven to it by force of circumstances.

The farmers in this section of the country are mostly grain farmers. Does it pay them to devote most of their time to the raising of grain? I say no. The price of all farm products are hanging in the lowest notches. The farmers are almost compelled to resort to and put their full force to that part of their industry which is the least effected by an over-production, and that is dairying. Dairying has suffered the least in this respect. It has this peculiar merit over the business of grain raising, that as its products drop in selling price, there is still a greater drop in cost—an increasing net profit; while in grain there is a shrinkage in yield as well as in price—the line of profit is shortened

at both ends. It is objected to that the average farmer cannot be a good dairyman.

The proposition that he is not will hold good, because he keeps an average cow that only yields from fifteen hundred to three thousand quarts of milk, or eighty to one hundred and twenty pounds of butter yearly. But the idea that he has not the capacity to learn the dairy business is absurd. With him it is a matter of attention, not of intellect. He does not want to be a good dairyman.

The average farmer has mind enough, but he is mentally lazy or sleepy. If he only knew how much undeveloped unused strength he had in his head, you would soon see in him a dawning of self-respect, an activity of thought, a mastery of business principles, which would command the respect of all men.

But the average farmer finds thinking tiresome. Keeping a cash account, or any account whatever, a bore. He finds that to successfully breed and feed good stock he must keep a full head of steam on his thinking machinery all of the time.

He does not like the pressure, he dodges it, and frequently takes the pressure of debt instead. Many farmers object to going into the dairy business because of over-production. There is no over-production of first-class butter; there never has been, and probably never will be. There is a glut of poor butter because it is poor, and people do not want it. We all know that a pound of poor butter lasts three times as long as a pound of good butter. If the butter that is to be consumed next week in the United States could be turned, through some mysterious process, into a first-class article, it would not last three days.

There will never be an over-production if our farmers and dairymen will take their milk to the creameries and have a uniform article made out of it.

The old shoemaker who told his young apprentice that he would have a good trade as long as children were born barefooted, had a pretty clear insight of the future; the same with the fruits of the cow. As long as people eat and enjoy the eating of good food.

Some farmers say that it does not pay to go in the dairy business. I suppose that if a dairy farmer is not successful up to a fair profit the difficulty is with him.

We know it would be a great deal more popular to charge the lack of success to the seasons, to ill luck, to monopolies, or to the tariff. So many men can't bear to face their own lack of good sense or persistent ignorance. It is so much easier to lay the blame to something or somebody outside. That sort of spirit is the very reason why such men never improve or love anything.

BREEDING AND RAISING POULTRY.

By W. A. YERKES, *Richboro', Bucks county.*

(Read at Hatboro' Institute.)

Now, as I regard the meaning of the term breeding, as applied to poultry, it is the production of distinct breeds, and to this phase of the subject I have never given any attention therefore have nothing to say.

To the raising of poultry I am now devoting considerable of my time and therefore am somewhat interested in it if my knowledge is not very extensive.

Although I do not think the method I am now employing is the one best suited to the farmers in general, yet as I am somewhat more familiar with that than any other you will pardon my dwelling on it somewhat.

Now some of you are possibly thinking of buying an incubator, or maybe have just bought one, and you will want to know why I do not think, so I will try to make this plain to you.

In the first place, the hatching and rearing of chickens by artificial means, to be in any degree successful, requires closer application and more time than most farmers are either able or willing to give to any one branch of their business, for, in order to succeed, you must see to it that the conditions are all favorable from the start to the finish, or, in other words from the time you put the eggs in the incubator until you get your chicken or duck, as the case may be, into the market; and here let me say these two varieties of our domestic fowls are about all that it will pay to raise in this manner.

Now the makers of almost all of the self-regulating incubators will tell you that all you need to do is to put your eggs in the machine, light the lamp and the machine will do the rest; don't do it that way, for the health of your chick after it is hatched will depend largely on its having passed through the period of incubation without any hatch whatever.

Or it may be you have gotten through this part of the business all right and have a nice healthy lot of chicks to put off, and you are congratulating yourself on your success when suddenly the heat in your brooder goes away up; in your haste to rectify this you get it too low, your nice healthy lot of chicks are done for.

Now, unless you are willing to practice a great deal of self-denial, and to forego a considerable portion of your accustomed recreation, I would say to you, don't invest your money in a costly incubator and a fancy brooder house.

But I do not mean to say that this manner of raising poultry profitably is impossible to all farmers, for where there is a large family, or plenty of help employed, some one or two of them can make this their especial care and meet with good success.

This is however by no means all there is of poultry raising; on every farm you will find at this time of the year, a flock of hens, how many of them are paying for the feed they eat, in the eggs they lay, let us consider how this may be remedied. The normal condition of the hen is to lay eggs. And why should she not lay them as well now while they are high, as after while when they sell for almost nothing; there must be some reason for it.

In the first place no hen kept in cold quarters will lay eggs in cold weather, no matter what the feed may be, in the next no matter how comfortable the quarters are, if she is not fed properly she will not lay. Or the house may be of the warmest and the feed all right if proper attention is not given to cleanliness the result will be the same. Did it ever occur to you to consider how much time you give to the care of your poultry.

Your horses must be groomed well every day, their stables well cleaned, your dairy ditto, but if your hen house is cleaned once a year it is as often as you consider necessary.

The claim is often made that the way to raise healthy poultry is to allow them to roost out of doors. Now would you expect a hen to come off such a perch in cold winter weather, go hunt a nest in the edge of a rick of cornfodder and lay an egg, I think not. Yet between the house cleaned once a year and the out-door roost, I think the out door has it.

You do not need to build expensive houses, but see to it that they are built so as to secure plenty of ventilation in warm weather, as well as to shut out the cold winds in winter. Keep them well cleaned and free from vermin; give your hens plenty of a variety of feed, and this means about all they will eat; clean fed three times a day and you will be surprised at the returns.

Farmers are very apt to pooh, pooh, the poultry business, and think about the profit there is in it, is what is got for that flock of turkeys that were raised principally on their neighbors.

Now let me give you some facts; there is in my neighborhood a flock of last year's pullets that have been laying for the past two or three months an average of three and one-half dozen eggs per day; take these eggs at the present price of thirty-five cents per dozen; you have an income of eight dollars and fifty-seven cents per week; allowing them a ration of two bushels of corn, one bushel of wheat and one of oats for the week, with the addition of some meat scrap and oyster shells; the whole cost of feed would not be more than four dollars and fifty-seven cents, leaving a profit of four dollars or almost one hundred per cent. for your labor.

It has been a question with me whether the practice commonly followed by farmers of allowing poultry to roam at large, to forage for themselves, was the proper thing to do. Now with the laying hen in summer this may be well enough, but take the hen with young chickens, you shut her in the coop until the chick is a few days old then you open the coop in the morning and leave her free to wander where she pleases, and, with all her motherly instincts, I doubt very much whether she is a good judge of just how much exercise is needed by the young chicken, and is very likely to give them too much, resulting in the death of some of them every day and beside this constant drain on the strength of the young chick prevents it making the growth that it would if more closely confined.

I know this is contrary to the notions generally prevailing on the subject, but when you make a chicken raised in this manner weigh two and one-fourth pounds dressed at nine weeks old, I will give in.

Now there are two ways of confining the hen, one is to leave her shut in the coop all the time until the chicks are three or four weeks old, and if she is well cared for this will do her no harm while the young chicks will know just where to find her when they want to rest or get warm.

The other plan is to make a small yard which can be cheaply done by using poultry wire fastened to stakes place the coop in it and allow the hen to have the run of this yard, the young chicks can get through the meshes if they want to. If at any time you wish to move the yard it is very easily done.

But there is still another way which is growing in favor with many and it does away with the hen altogether after the chicks are hatched, a very inexpensive style of brooder may be made suitable for placing out of doors which will accommodate about fifty chicks, place boards around this so as to confine you chickens near by for a few days when

the boards may be removed entirely, they will never wander very far and if your brooders are not set too closely together they will all return to their own roost and feed.

Now I take it that a great deal of the profit in raising poultry is lost in the time it takes to grow it, of course it takes a certain amount of feed to sustain life, and if you give your chicken just this quantity it is not going to grow very fast. Go around almost any farm and you will see chickens from six to eight months old that will not weigh more than three or four pounds, now any good healthy chicken, properly cared for and well fed, will weigh that much at from three to four months and just here is where you will get your profit, always see to it that your young chickens have all the feed they will eat clean three times a day, and if closely confined give them some green food between times with plenty of good clean water to drink and they will more than pay you for your extra trouble.

The change in the times has its effect on poultry raising as well as on every other business, and the tendency now is not so much to raise prices as to see who can produce an article of the best quality for the least money.

Of course if we could get the price for spring chickens now which were obtained fifteen or twenty years ago, the profits could be handsome. But compare the prices now received for these with the other products of the farm, the reduction is considerably less, while if you take the price of poultry all the year round it will almost if not quite equal what you got when you were receiving double what you do now for the other products of the farm.

You often hear the question asked if so many turn their attention to poultry raising will it not be over done.

I think not, the demand in general seems to be in the excess of the supply, of course just now there seems to be a glut in the poultry market, and for this many reasons might be given; but I think the true reason is that too much of last year's supply of poultry was hoarded for the holiday market.

Now, in conclusion, I would say to you if you have a large farm and are not overstocked with help don't go into the business too extensively but as far as you do go do it thoroughly.

If you have a small place and plenty of help you can add several dollars to your yearly income by giving close attention to this business.

I would also extend an invitation to any one feeling an interest in this subject to visit my place in Richboro', when I shall be very glad to show them what we are doing in the business.

AGRICULTURAL PROGRESS.

By F. B. MARTIN, *Muff, Pa.*

(Read at Dayton Institute.)

This subject is of magnificent breadth, stretching back from the present time to the beginning of the race. What a field for imagination as well as for facts—facts, as to what has been done in the past, and imagination as to what may be accomplished in the future.

We do not mean to outline the progress made in agriculture from the beginning to the days of Uncle Jeremiah Rusk. Of this superstructure of agricultural progress, its foundations have been laid strong and wide.

Its record, in the past in our own country is safe and secure; the seal of time is upon it. It is deposited with the records of the government itself and, by the Department of Agriculture, it has been scattered broad cast over the land, giving information to those who care to read on the volume of production of the different branches that cluster around agriculture. Giving information as to how this production may be increased.

Although it is a well-established axiom in political economy that the wealth and material welfare of nations upon which their power and financial prosperity depend are primarily determined by the productive forces each country possesses within itself, it is conceded that the effects of institutions, social, economic or administrative, have done more to increase their industrial interests than all other moral and political causes combined. In common language we often hear a country spoken of as agricultural, manufacturing or commercial, but these terms imply only relative values, which serve to indicate the degree of importance occupied in a given territory by one or other of these three branches of productive industry, or rather the degree of development at which its industry or commerce has arrived. For at all times, and in all countries, agriculture, the "nursing mother of nations," forms the basis of wealth and prosperity; and the plow in its modest guise plays the principal part in the creation of values, of this our own country furnishes a most notable example. In the scale of nations she is decidedly the most commercial as well as the most industrial. Her trade and industry form the basis of her power and yet it appears from the returns of her income tax, that the net revenue of all her manufactures and commerce and of all her personal capital does not exceed the net revenue derived from her agriculture alone.

From this single fact we may infer the degree of pre-eminence which should be attributed to the agricultural element of national wealth.

The pursuit of agriculture has in its charge the interest of an industrial class far more numerous than any other in the country. Strange would it be indeed had no progress been made with a territory of such breadth, a climate so varied, a soil so generous, with a continuous stream of agricultural immigration pouring into our borders, with the constantly increasing advantages derived from improved skill and labor saving appliances.

It is also worthy of note that on every hand can be found an increased interest in the farmer in his work.

Local societies in the interest of agriculture are multiplying in number as well as in size. Interest in discussions upon agricultural

topics is everywhere increasing, and indeed upon all sides can be seen encouraging evidence of the desire on the part of the farmer for the latest information upon timely subjects which shall enable him to cultivate the soil more intelligently than those who have cultivated it before him, and which shall enable him to leave it richer and more productive for those who are to follow him. When the United States were first visited by Europeans, agriculture was here practiced in limited areas by the wives of Indians, without the aid of domestic animals or any implements except clam shells, the antlers of deer or elk, and pointed sticks of wood. European settlements began and civilization gradually extended, heralded by the sound of the woodman's axe and the crash of trees. As the country became more and more settled, considerable tracts situated in what now constitute the Atlantic and the Gulf States were cleared, laid open to the sun and converted into luxuriant meadows and fertile states producing all the different grains.

As all inquiries on the subject of agricultural progress must be derived from facts they can only be answered by history or statistics, which throw comparatively but little light on these topics up to the period of the formation of our government. It appears, however, that it was the wise and farsighted policy of all the civilized nations who laid claim to American soil, except in some cases where an insatiable avarice prevailed in subjecting the Indians to involuntary servitude or otherwise, depriving them of their natural rights, to encourage the agriculture of their respective territories, by inducing emigration in making free grants or concessions of land to companies as well as to individuals.

By the means contributed by the appliances and improvements which have resulted from modern art and discovery, forests have been cleared, marshes and lakes drained and converted into arable fields hillsides and plains made fertile by irrigation: useful products introduced or improved and their properties recognized, represented and compared with those of the soils in which they grew.

From the earliest history of our government, grants of land have been made for the encouragement of agriculture and indeed before, from 1523 to 1796 different grants had been made which gave such a stimulus to agriculture that Congress, in 1817, granted four townships of land, comprising 92,160 acres, in the State of Alabama to agents for the purpose of settlement and on certain conditions. To each adult, one quarter section of land to pay the sum of two dollars per acre.

The pre-emption system afterwards expanded into one of vast proportions under the different acts of Congress.

Another interesting feature in our agricultural progress is the annual appropriations by Congress for the collection of agricultural statistics, investigations for promoting agricultural and rural economy and the procurement of cuttings and seeds for gratuitous distribution among the farmers.

Another object of encouragement from the public purse, and one which was advocated by Washington and Jefferson, as well as by other Presidents since, is agricultural education. Direct aid has been bestowed upon it by the general government and by the different states in erecting agricultural colleges. The ultimate end aimed at by founding these educational institutions is the united development and instruction of the religious, the intellectual and the physical qualities

of man. It recognizes the whole man in all its department of his being the object of his care.

Its aim is not merely to instruct or to impart knowledge but to awaken, develop, train and discipline all the talent, inborn powers and faculties of man, that he may command them for the high and noble use for which they may be capable or for which they were designed.

It claims for the farmer, first, his as a man, trained and fitted to the full extent of his capacities for all the duties of a good citizen.

The scheme embraces the best practical training in agriculture, second, in connection with it studies a patriotism which shall embrace his whole country and devotion to the principles of the government will be faithfully instilled. Its teaching will rise above section and party will know no difference of class and acknowledge no personal superiority but what is due to worth and excellence of character. It also embraces an experimental and model farm with a plan for the advancement of agricultural science based upon practice. In the general management of the farm it is proposed to make a model and an example of the best modes of culture in the several departments of agriculture.

It is to be stocked with the best breeds of cattle, sheep and horses, and the most approved tools implements and machines.

The progress of agriculture in the United States is obvious from the paucity of statistics, prior to the year 1840. It would be difficult to arrive at any fixed ratio of increase of any particular product.

In the production of wheat in 1840 amounted to eighty-four and one-half million bushels; in 1850, a period of ten years, the production was one hundred million bushels and in 1884, a period of thirty-four years, the wheat crop was about five times as large as in 1850, amounting to nearly five hundred million bushels and all the other farm productions have a corresponding increase. What a progress in production in this one branch of agriculture.

In 1850, the number of horses in the United States was 4,336,719. While in 1884 the number was 12,077,657, an increase of nearly eight millions.

In 1850 the sheep numbered 21,723,220 and in 1884 they increased to 48,332,331. So in all others, the increase has been as great. So it is plain from these figures and facts that great progress has been made and judging the future by the past much may and will be attained in the years to come.

COMMERCIAL FERTILIZERS.

By E. F. HEIL, Nazareth, Pa.

(Read at the Farmers' Institute, held at Bath, Northampton county, Pa.)

This subject of commercial fertilizers is of greater importance and magnitude than is generally supposed. Hundreds of thousands of dollars are annually expended in Pennsylvania alone for commercial fertilizers.

About five hundred different brands are annually analyzed by the state chemist, and yet I believe to be within the bounds of truth, when

I say that there is no one article or commodity generally purchased by the farmers of which less is known.

I shall endeavor to enlighten you on this point as well as I am able, from a farmer's standpoint, and for the benefit of the farmer, well knowing that I am not competent to do the subject justice as it deserves.

In my endeavors to give you a proper understanding of this subject, I will have to take you away in your thoughts (so to say) from your homes and bring you in the laboratory and experimental field of a chemist. But if you will kindly give me your attention I will bring you back to your own farms.

As early as 1830, commercial fertilizers have been in use, at that time, and for some time after guanos were mostly used—that they had manurial value was well known, but as to the substances which made them of value as a manure little was known or, at least, they were but imperfectly understood. Later on chemistry came to the aid of the farmer.

Between the years 1867 and 1875, a period of time extending over a series of eight years, George De Villie, a French chemist, under the patronage of the French government, commenced a series of experiments on the experimental fields, at Vincennes in France, which were later extended to various parts of the country and to England and to this country, for the purpose of finding, in the most practical way, not only just what were the most necessary elements in plant production, but just in what measure the soil would naturally supply them, as well as to determine the exact difference between soils that had been reduced to an impoverished or poor condition by successive cropping and those that were in a high state of productiveness. Villie's theory was of a practical nature; he commenced with the wheat plant which he analyzed. The elements of the plant were prepared in the shape of chemical powders, in the same proportion in which they were found in the plant. Soil was prepared by taking pure sand, washing and burning the same by heating, so that no particle of manurial substance might be retained therein. Glazed earthen pots were employed, wherein the seed was planted, to the number of the various elements of the plant, the whole being watered from time to time with distilled water, so that no particle of manurial substances might be contained in the water. After experimenting a long time he at last found that fourteen substances entered into wheat and its straw. These fourteen substances he divided into one hundred parts and also in three divisions, the substances in the first division are carbon, hydrogen and oxygen, these three substances constitute ninety-three and fifty-five one hundredth part of the one hundred parts, and are derived from the air and rain and is furnished by the all-wise Creator.

The second division is composed of soda, magnesia, sulphuric acid, chlorine, ferric oxide, silica and magnesia.

These seven substances constitute three and two hundred and ninety-six parts, or a little over three and one-fourth parts of the aforesaid one hundred parts.

These the soil is superabundantly provided with, and it is unnecessary to add them.

We now have four more substances to account for, they are nitrogen, one and sixty-one hundredths; phosphoric acid, forty-five one hundredths; potash, sixty-six one hundredths, and lime, twenty-nine one

hundredths. These four substances constitute three parts of the one hundred parts.

These four substances the soil preserves only to a limited extent and the deficiency is supplied by artificial means or manure.

Is it not a wonderful thing to contemplate that we have only to supply three parts out of one hundred to produce our crops.

We are now in a measure prepared to proceed in a more practical manner.

These substances, viz: nitrogen, phosphoric acid, potash and lime are and must be in the soil to make it at all productive. They are also present in our grain, straw, hay, in the different foods we feed, in the bodies of the animals we have on the farm, in the manure we make, the manurial value depending upon the quantity of these substances they contain and in various degrees. And by selling and taking them away we are taking these substances away, thereby depleting our farms.

In selling and taking away one ton of timothy hay from our farms we remove twice as much fertility as we do by removing one ton of wheat straw. And by removing a ton of clover hay we remove over three times as much as we do by taking away a ton of wheat straw. How and why does this come to take place, all three being but a ton, no more nor less, and nearly the same in bulk? Simple enough, the ton of straw contains ten and two-tenth pounds of nitrogen, one and eight-tenth pounds of phosphoric acid, fourteen and eight-tenth pounds of potash, which have a value of two dollars and a half. The timothy hay contains twenty pounds of nitrogen, seven and two-tenth pounds of phosphoric acid and twenty-six pounds of potash, having a value of five dollars which is twice as much as the straw.

The ton of clover hay contains thirty-nine and eight-tenth pounds of nitrogen, seven and two-tenth pounds of phosphoric acid and thirty three and six-tenth pounds of potash, having a value of eight dollars and sixty cents, which is over three times the value of the wheat straw. You will naturally want to know upon what these values are based, because these substances, viz: nitrogen, phosphoric acid and potash are sold daily in the markets of the world, and then come under the head of commercial fertilizers, or raw materials to make them of, and have a market value, as well as our wheat, corn or other farm products.

By selling one hundred bushels of wheat we remove twenty dollars worth of fertility, so of everything we are taking away something of greater or less manurial value.

It is therefore plain, that we must look to some other source for this deficiency, there are several ways of doing this as you all know, and which is the best and most economical I do not pretend to tell you, but leave it to your own judgment.

First and foremost is probably barn-yard manure. A ton of stable manure contains about eight pounds of nitrogen, three pounds of phosphoric acid and ten pounds of potash, depending to a very great extent of what it is composed, the total quantity having a fertilizing value, will vary between twenty-two and thirty-nine pounds per ton, sixty to seventy-five per cent. is water, most of the balance is vegetable or organic matter, having no manurial value except to retain moisture and keep the soil loose and pliable and in a better mechanical condition.

But in putting the manure on the farm made from materials raised

thereon and fed out on the same, we are still short of that which we sold off. Now how can we supply the deficiency? We will have to go outside of our farms.

In using a commercial fertilizer we are putting on the same substances that are contained in our crops and in the stable manure. Provided we use reasonable care in selecting them.

There are also substances which contain nitrogen, phosphoric acid and potash in a very much greater degree than our hay, grain, straw or stable manure.

Ground bone contains from two to five per cent. of nitrogen, eighteen to twenty-five per cent. of phosphoric acid and which is forty to one hundred pounds of nitrogen and three hundred and sixty to five hundred pounds per ton of phosphoric acid, guano, nitrate of soda, dried blood, cotton seed meal (which by the way is also a very rich cattle food), dried fish and animal matter, all these substances contain nitrogen in a very high degree.

Phosphoric acid is mostly derived from bone guano, from South Carolina rock, ground fish, bone black, etc.

This bone black is also a true bone, but is burned or charred and used in sugar refineries to refine sugar and after it is no longer useful for that purpose it is ground up and sold for fertilizer materials for its phosphoric acid.

South Carolina rock, as its name indicates, is found in South Carolina, along the Ashley and Cooley rivers and found in beds from three inches to six feet in depth, also in beds of blue clay in lumps, it is also found in Canada. The rock contains nothing but phosphoric acid, whilst the aforementioned substances also contain nitrogen and some of them potash. Potash is mostly derived from sulphate of potash, muriate of potash and kainit or German potash salts. Out of these and some others commercial fertilizers are made. I have also said that lime is one of the substances necessary to the plant, the lime is left out in making a fertilizer, because these substances come in combination with lime, especially those containing phosphoric acid sufficient for the needs of the plant. And as these raw materials are not in a readily available condition for the plants they are treated with sulphuric acid to make them more readily available to the plant.

These, then, are the substances after being ground and put in a merchantable shape, of which our commercial fertilizers, or phosphates as we call them, are composed.

When commercial fertilizers first came into general use, there also came with them gross frauds offering all kinds of stuff, some of which had very little and some no value at all. This thing became so bad that finally, through the efforts of the State Board of Agriculture, a law was passed in 1879 for the protection of the farmer, as follows: That every package for commercial fertilizer offered or exposed for sale within the state shall have plainly stamped thereon the name of the manufacturer, the net weight and an analysis stating therein the per cent. of nitrogen or ammonia in an available form of solution, reverted and insoluble phosphoric acid and of potash. And that every manufacturer, before offering the same for sale, shall pay to the treasurer from ten to thirty dollars according to the amount sold. And for offering or exposing for sale without the payment of the above sums, shall be punishable by a fine from twenty-five to one hundred dollars.

The fees of said license shall be used to pay the expenses for making analysis of samples.

This is the reason we see stamped on every bag what they are to contain and show with a reasonable certainty what farmers are buying. It ought not to be necessary to bring this before you, but as it is of importance, and as I know from personal knowledge that nine out of every ten purchasing fertilizers take it simply as some trade mark, or something of no consequence. But it is a guarantee that they do contain that amount and quantity of fertilizing materials between the maximum and minimum numbers as stamped thereon, which manufacturers are compelled to put on for the protection of the purchaser by law. And if found by analyses not to contain the amount of ingredients they purport to contain they are punishable with a fine from twenty-five to one hundred dollars, provided the informant is the purchaser and user.

The samples are drawn by agents of the state who collect them, under oath, without the knowledge of the manufacturer; these are analyzed by the state chemist and are published by the state, in sheet form, and are distributed free to all who apply for them. Prices are fixed by the state chemist for the different substances for the fertilizer year which begins on the first of August and ends on the first of August the following year.

These are somewhat more complicated although more just than under the former state chemist, Genth. Valuations were based on eight cents per pound for soluble and reverted and five cents for insoluble phosphoric acid if from bone. Four cents in unmixed fertilizer which derive it mainly from fish tankage, etc., and two cents if from South Carolina rock; potash, five cents and ammonia seventeen cents, all these have to be soluble in water except phosphoric acid, which is divided in three grades, viz: soluble and reverted, these two together make the available, and insoluble. The soluble portion is first taken up by the plant, the reverted part is next taken by the plant, the insoluble probably of no value to the plant to which it is applied, but may and doubtless does become valuable to plants if the same is derived from first-class material; if from hair, horn shavings and coarse fish scrap, we cannot depend much on insoluble phosphoric acid.

In selecting a fertilizer, first examine an analyses list to find if the brand you intend to buy does contain what it purports, and its commercial or manurial value, for there are, in spite of the stringent law, fertilizers sold which have not near their cost value.

A few years ago a fertilizer was sold having a manurial value of three dollars and eight cents per ton. Another having a manurial value of two dollars and fourteen cents a ton and selling at twenty dollars. Still another having a value thirty-six cents a ton and selling at eighteen per ton. This would go to show that it is very important to select by analyses, but such brands are getting fewer every year. For this we are indebted to the State Board of Agriculture.

Still we have to be on our guard and buy only from reliable firms.

The state in analyzing the fertilizers divides them in three classes.

The first is what is called a complete fertilizer, because it is to contain all the manurial substances necessary to crops, viz: nitrogen, phosphoric acid and potash, in varying proportion, it also includes special fertilizers, as for corn, potatoes, tobacco, etc., they containing more of the ingredients than those crops require.

The second class is ground animal bone, and contains from two to five per cent. of nitrogen or ammonia and from thirteen to twenty-four per cent. of insoluble phosphoric acid.

The third class is acidulated South Carolina rock this contains nothing but phosphoric acid, from thirteen to nineteen per cent., when treated with sulphuric acid, to make it available, and is, therefore, not a perfect plant food; when used it usually brings good results; it is mostly used in low-priced fertilizers. But as it contains but one of the substances needed by the plants, by its continued use the soil will become depleted of the nitrogen and potash; the soil will then refuse to produce paying crops.

This is the reason that some farmers come to say they had just as good results from a low-priced article as from a higher priced or complete fertilizer.

In selecting a fertilizer it is economy to buy a high grade article instead of a low grade, because these substances are always bought and sold in their raw state, by the per cent. and not by the gross ton. For example a ton of raw materials, as bone for instance, a ton containing ten per cent. of phosphoric acid and two per cent. of nitrogen or ammonia would sell for just one-half of what one ton would contain twenty per cent. of phosphoric acid and four per cent. of nitrogen or ammonia, notwithstanding both being a ton in bulk and weight. In a low grade we have to pay for manufacturing, bagging, freight, agents' commissions, on two tons instead of one. It would therefore be economy to put only half the quantity on an acre of the high-grade article as was intended of the low grade.

In the application of about two hundred and forty to two hundred and fifty pounds of a high grade fertilizer, made out of standard materials, to an acre, having from ten to twelve per cent. of available phosphoric acid, three to four per cent. of ammonia and from three to four per cent. of potash, this will have a comparative or manurial value of thirty-four dollars or thirty-five dollars per ton, as shown by analyses, and will cost about thirty-six dollars or thirty-seven dollars and raising twenty bushels of wheat from the acre, not calculating the straw, as this is usually made into manure, the farmer will have as much fertility on his farm as he had before the crop was taken away. Calculating the straw at a ton and a half, and selling or taking it away, and also twenty bushels of wheat, and having applied four hundred and fifty to four hundred and sixty pound, of the same fertilizer to the acre, the soil on the acre would contain the same fertility, in money value, as it did before the crop was taken off. As to the manurial constituents it would contain somewhat less nitrogen and potash and somewhat more phosphoric acid. If, on the other hand, the acre did not produce twenty bushels of wheat, and less than a ton and a half of straw, it would be in a better state of fertility then it was before the crop was taken off, and the balance of the fertilizing substance would remain in the soil until used by future plants. Except in the case of nitrogen there would be some loss. The most important part to the farmers is will it pay to use commercial fertilizers?

This can be answered by both yes and no. If your soil is well and abundantly supplied with these manurial substances, which I have endeavored to explain to you, it will not pay you. Because in putting these substances in the soil we are feeding the plants. We feed our farm animals with the different foods they need, and if fed them more then is necessary to supply their wants they will simply refuse to eat what is given them in excess of their wants.

Feeding our farm animals, and putting fertilizers or manure in the soil, or to the plants, is one and the same thing, it is only done in a

different manner. On the other hand if we know that our soil is lacking in the elements of fertility it would just as surely pay, and perhaps more, as it will to feed well a half-starved farm animal. On this point I cannot do better, nor as well as by quoting to you what was said by Joseph Wilcox, mineralogist of the State Board of Agriculture, a few years ago at a lecture, it is this: If a stalk of grain could speak it might truly say to the farmers, like you I live, like you I must have food and drink to support life if you wish me to grow fast and large; and yet you stint me in supplying the substances necessary to my development. You feed your own children liberally to make them grow, while you put me on a low diet, expecting me to perform what you should know is an impossibility. Your prosperity depends upon the vigorous growth of mine and kindred species of plants. Yet how little thought have you given to the study of our habits and needs. We do succeed to a moderate degree, in spite of your negligence, and that fact encourages you to continued negligence. Feed me and I will feed you.

The most beneficial way of using a commercial fertilizer in my experience, is if your soil is in a poor or only a moderate state of fertility, and the field is intended to be laid down in grass the following year, to apply from two hundred to two hundred and fifty pounds or even more of a fertilizer made of standard materials, and containing from three to four per cent. of ammonia, from twelve to sixteen per cent. of phosphoric acid and three to four per cent. of potash. and sown with wheat it will pay you for the fertilizer and perhaps more in increase of the wheat alone, whilst it will also increase the yield of straw, and the following year it will increase the yield of grass, and consequently a heavier sod which will be an indirect benefit to a very great extent.

It is sometimes contended by farmers that the fertility of the soil cannot be maintained by the use of commercial fertilizers alone. This can hardly be possible, for in a standard fertilizer we are applying the same substances that are contained in stable manure, as I have endeavored to explain to you.

It has also been proved by experiment. On the experimental farm of Laws & Gilbert, at Rothamsted, England, they have experimented on the same field for over twenty-five years. Without yard manure, but by the use of fertilizers alone, have annually increased the production of the field, the land producing better crops each year; it has also been shown at the experiment station of this state, that the soil can be kept up in its fertility by its use alone. And I have myself seen in our neighboring county of Lehigh as heavy a crop of wheat as you would wish to see which had been in wheat before for five consecutive years, and nothing having been applied but commercial fertilizers.

I could go on and tell you of numerous experiments and use of commercial fertilizers and their results. But I presume you would prefer to have me say something of my own experience, and experiments in the use and purchase of fertilizers, for they come nearer to our own farms.

Two or three years ago I, at one time, got a circular on fertilizers which contained a great many testimonials from all over the country, so I made up my mind to get some of this much lauded brand: accidentally it so happened that I could not get it. Some time later I got an analyses list and found it contained manurial substances to the value of six dollars and fifty-four cents and selling at twenty-five dollars.

This was a case where an accident turned into luck. This taught me a lesson, to first examine the analyses list before purchasing.

At another time I wanted a fertilizer to apply to corn and potatoes having a high per cent. of potash, from six to eight per cent. on hundred and twenty to one hundred and sixty, for the reason that these crops require a high per cent. of potash. But as I could not readily get it in that way, I done the best I could, and got one which purported to contain from three to four per cent. of potash, or from sixty to eighty pounds per ton, afterwards in examining a fertilizer list I found that it contained manurial substances to very near the value I paid for it. But it only contained three-fourths of one per cent. of potash, or fifteen pounds to the ton. This was a case like going to the store for a dollar's worth of coffee and getting a little coffee and the balance in sugar, getting the worth of your money, but not what you wanted, this taught me the lesson that it is not only necessary to see that you get the value of your money but also to see that you get what you want.

In the use of fertilizers I made an experiment on wheat to see whether it would pay or not, and with never a thought of bringing it before a farmers' institute.

The field upon which the experiment was made had been in wheat the year before, and had then received a dressing of about eight two-horse loads of stable manure to the acre, in the fall of 1886 it was again sown to wheat, with two bushels seed to the acre, and two hundred pounds of a complete fertilizer, containing, by analyses, three and forty-one hundredth per cent. of ammonia, eleven per cent. of soluble and reverted, or available phosphoric acid and two and eighty-one hundredths per cent. of potash, the whole having a manurial value of thirty-four dollars and twenty-eight cents per ton, for which I paid thirty-six dollars, making the cost of the fertilizer three dollars and sixty cents per acre. The experiment was made on a plot ten by thirty feet, or three hundred square feet, and was very carefully made, as they have to be on a small plot, or else they will be misleading, and I did not intend to cheat myself. The crop that year was a partial failure, the yield was as follows:

Where no fertilizer was applied ten bushel and fifty-two pound of wheat to the acre, and one thousand six hundred and two pounds of straw. Where fertilizer was applied the yield was fourteen bushels and thirty pounds of wheat, the wheat being also of a much better quality, and one thousand nine hundred and forty pounds of straw to the acre, making a difference of three bushels and thirty-eight pounds of wheat and a difference of three hundred and thirty-eight pounds of straw to the acre. The following year the field was in grass, timothy and clover, the experiment was not continued, so I cannot tell you the difference in weight of the hay. But the difference was quite apparent, and could be seen from a distance, in favor of the fertilizer.

The lesson this teaches me that where your soil is only in a moderate state of fertility, and applying a complete fertilizer, honestly put up, and applying two hundred pounds to the acre, it will pay for the fertilizer in a direct way, and will still pay you more in an indirect way.

I also made three experiments on corn in 1886, 1887 and 1888, these were made on plots of one-twenty-fifth of an acre, by the application of one hundred and fifty pounds to the acre of a fertilizer costing me thirty-six dollars a ton, making the cost of the fertilizer per acre two

dollars and sixty-two cents, the corn was planted with a cornplanter, one grain every twelve inches, and dropping the fertilizer along the whole row. The corn was husked, put in separate bags and kept in a dry place until about the first of January, then husked and weighed, and the amount calculated on an acre; this same process was repeated in each year, the soil in each field being also the same. The yield was as follows, in 1886, with fertilizer yielded fifty-four bushels, no fertilizer, thirty-four bushels, difference, twenty bushels to the acre.

In 1887, with fertilizer, yielded forty-nine and one-half bushels; with no fertilizer, forty and one-half bushels; difference nine bushels. In 1888, with fertilizer yielded fifty bushels, no fertilizer, forty-four and ten hundredth difference, five bushels and fifty pounds.

These are the facts and they were carefully made. But beyond all this lies a tale untold, we might suppose the season had something to do, not to my mind. The field or plot that made the extraordinary increase of yield of twenty bushels an acre was a thin timothy sod. The next, the one that made an increase of nine bushels per acre, has an ordinary clover and timothy sod.

The next or the one that made an increase of five bushels and fifty pounds, this field made a very heavy aftergrowth the year before and was only partly eaten off by the cattle, and the rest tramped down. This would go to show that where the soil is well supplied with the elements of fertility, as was the case in this last trial, which, by the presence of the clover which remained on the field, it had all the fertility needed, and it took only a limited quantity of what was applied and barely paid the expense.

On the other hand where the field made an increase of twenty bushels to the acre, which was lacking in those elements, it paid a very high per cent. of profit. On this field the fertilizer may also have had some thing to do by repelling the attacks of insects which work on the roots of the corn which they are likely to do on a timothy sod.

The average increase in yield of the three trials is eleven bushels and thirty-seven pound per acre, calculating the corn at fifty cents a bushel, the value of the increase would be five dollars and eighty-one cents per acre, and the cost of the fertilizer was two dollars and sixty-two cents per acre, would leave a balance of three dollars and nineteen cents per acre, which paid me a dividend of over one hundred per cent. on the investment.

These experiments teach me the lesson that fertilizers pay, and also that the previous fertility of the soil has as much to do as the fertilizer which is applied to make it pay.

THE RELATION OF FARMING TO OTHER OCCUPATIONS.

By REV. DAVID M. JAMES, *Bath, Pa.*

(Read at Bath Institute.)

An occupation is that business which engages the time and attention of any one. The principal business of one's life, the wants of mankind and the welfare of society, require many occupations, grew out of man's wants. Among the first wants of men, are houses to shelter us,

clothing to protect us, shoes to cover our feet and food to strengthen our bodies.

Hence among the first employments of mankind we have carpenters, tailors, dressmakers, hatters, brickmakers and lumbermen, boat carpenters. Besides these necessary callings to furnish us with the comforts for our bodies we need churches, schools, colleges, government, books, machinery and the like. Hence we have the various professions. The learned professions are, especially, theology, law and medicine. The needs of the people call forth the occupation. Thus you look out over the country and you see everywhere, people engaged in different affairs, in matters of religion, law, education, government, state and national, manufactory, private individual and public business.

Many of the affairs, however, in which men engage are not worthy, to be honored with a name, and are beneath the capacities and obligations of intelligent beings, and harmful to society. Such a life, it may be said, is not worth living. Evils of man originate demand.

Very few of the natural production of the earth are ready for immediate use in the forms in which we procure them. Therefore many are occupied in obtaining the materials, while other are engaged in manufacturing them into useful fabrics and implements of trade.

Some include in six occupations, those by which the common wants of man are supplied: 1, agriculture; 2, grazing; 3, fishing; 4, lumbering; 5, mining, and 6, manufacturing.

The grain into flour and meal. The wool and cotton into cloth. The hides into leather for shoes. The iron into iron for plows, stoves, heaters and farm, implements etc. The slate into roofing, curbing and pavements. Clay into earthenware, bricks and the like. Every honest and useful business contributes to the benefit of society.

All should be occupied, and in a civilized community most persons having sound bodies and minds are.

Savages and uncivilized tribes have no calling, but live a mere animal life without developing either the countries in which they live or the powers which nature has intrusted to them.

What relation does the occupation of the husbandman sustain to other employments of men?

It stands first in the catalogue. It sustains all other callings. It was the first occupation of man.

According to Moses, the first human pair had their first earthly wants supplied by their creator in a *home* in a garden in Paradise, a quiet beautiful spot, planted with trees of beauty for the eye, and fruitful for food. The food that sustained animal life grew out of the ground. But even in a state of innocence, when everything was very good, the fruits of the earth were to be improved by man's care and skill. He was to be occupied.

He put the man in the garden to keep it and to dress it.

Man began in his first state with fruit culture—horticulture.

And after he had sinned and was excluded from his first home, it was decreed that he and all his descendants should eat their bread by the sweat of the brow.

After the fall he descended to the culture of the field and the tending of cattle. When his two sons had grown to be men they chose their occupations. Cain turning to agriculture, and Able to pastoral life. Able was a keeper (feeder) of sheep, but Cain was a tiller of the ground.

In the occupation of these two sons of Adam, we trace the two great

branches of productive industry pursued by men in the primitive state of society.

We include therefore in farming or agriculture: 1. Fruit culture. 2. Stock raising, and, 3. Farming or grain production. This is the order of the divine government. Solomon places the highest honor upon the farmer when he says, "The profit of the earth is for all: the king is served by the field." King to farmer. This calling is the most necessary of all others to support human life. The profit to be secured from the ground is for all. All need it, all men, and all inferior creatures. The same earth brings forth bread for man and grass for the cattle. The king himself is served from it. There is enough for all and will be as long as the earth remains.

Seed time and harvest, and cold and heat, and summer and winter, day and night shall not cease. Only once in the history of the world was there no harvest, that year when the flood came.

There is a level to which we must all come, bread must be furnished by the sweat of some one's brow. The many have the benefit to it, the mighty cannot live without it.

The farmer may take up the lamentation now so common, and so often repeated—"There is no money in farming," and reflect upon it as menial occupation. Yet there is honor in it. There is antiquity in it. There is necessity in it. We cannot live without it.

The President of the United States, the Senators, the members of the House, the Governors and all professional and laboring classes depend upon the husbandman for daily supplies. The king is more dependent upon the farmer than the farmer is upon him. Queen Victoria eats her bread from our wheat. And Bismarck eats our beef and pork, and canned meats. The relation of the occupation of farming to the other occupations then is, the farmer solves the food problem.

The first thing a man wants is something to eat, that is an absolute want. Bread is the staff of life.

To furnish food for the population of the nation, and for the animals of the nation, is no light work. There is money in it too. It requires more labor and food to keep the animals than it does to support the population.

This want must be supplied every day. The first thing the child wants is food, and if it is not furnished the child will cry. If all the farmers should strike that would block the nation and block themselves too.

If food is withheld all other occupations must cease—the mechanic cannot work, the lawyer cannot plead, the physician cannot heal, the preacher cannot preach, the teacher cannot teach, the soldier cannot fight, the prophet cannot predict, he must be feed either by ravens or in some other way. So must the animals have their food. The animals cannot thrive without man's care. God assigned this care to man in the beginning. That he should have dominion over the fish of the sea, and over the fowl of the air, and over all the cattle and over all the earth.

They degenerate without the husband man's care. And we are indebted to the farmer for the great improvement in stock, in cattle, horses, sheep, swine and improved breeds of fowls. And if they are neglected they have a way of calling man's attention to them. They must have their food.

The hungry native calf will bawl. The pig will squeal. The lamb will bleat. The ox will bellow. The ass will bray. The colt will

neigh. The chicken will peep. The duck will quack. The turkey will gobble. The rooster will not crow. The dog will bark and howl. The cat will mew.

What a noise we would have hereabout if the farmers should fail with their supplies.

No other occupations could furnish the supplies. No other produce. The farmer stops such disaster every month.

A nation without food would be like Nineveh in the days of Jonah. The King, in order to call the people to repentance, proclaimed, "Let neither man nor beast, herd nor flock taste anything: let them not feed, nor drink water, but let them cry mightily unto God." Hence a famine has always been the greatest temporal calamity that can afflict a people.

When a nation, in its cities, in its towns and in the country, from the President down to the humblest citizen, sit down to dinner every day, they may find wholesome supplies of bread and vegetables, fruits and meats, furnished by whom? Who sowed the wheat? Who fed the stock? Who tilled the vegetables, and whence came the butter and milk and the like? From the farmer. Surely there is a sunny side to the farmer's life. He is a great deal in the sun, and the sun shines on all sides of him and also above him, and there is some compensation for him in the consideration of the good he can accomplish in furnishing supplies for others.

How entirely was the nation dependent upon the farmer for supplies during our last unhappy war. While more than a million of our people were called from the industries of life, and many of them from the farm, to engage in warfare for the preservation of the union, the farmers at home applied renewed activity to their occupation, and by the aid of machinery and additional help, and the abundant harvests and the blessing of God, were able to furnish provision for the army and navy, and for all the mass of people in civil life, and have a surplus for exportation to other countries, and donations for the suffering poor.

And now as we look over the various nations of the world and behold the drift and tendency of affairs, we have reason to congratulate ourselves, and especially the farmers, that while the great nations of Europe are straining every effort to make science the handmaid of war, it is the glory and honor of the American people to make science the handmaid of agriculture.

The Congress of America has just constituted the interests of agriculture of this country into a Department of Agriculture, and advanced it to the dignity of a department of the government, and made its chief officer a member of the cabinet.

Who can estimate the amount of gratitude due the pioneer farmers who first settled in this country? Who felled the forests, cleared the land, bridged the streams, constructed the roads, planted the trees and orchards, removed obstructions, built farm houses and barns, and prepared the way for the growth and prosperity of villages, cities and commerce? These fathers labored, and we have entered into their labors, they did more than this. The farmer, more than any other class or occupation, laid the foundation for our churches and schools, which have had such an influence to make the nation what it is. History corroborates the fact that a large number, if not a majority, of the most useful and loyal of our early pioneer ministers of the gospel, honest lawyers, officers of army, skillful physicians, teachers,

successful merchants and mechanics had their original training on the farm and in farmers' families.

Let the farmers honor their occupation, maintain their dignity and character, and not decry the first and most necessary of all the occupations, we cannot live without it. It is the decree of heaven, that man's bread must be procured in this way. The occupation will honor him if he will honor it.

Our own government has advanced it to the front by constituting the Department of Agriculture and choosing a secretary equal in rank with the other cabinet officers, who in his last report, at a low estimate, values the farms of the United States to exceed ten thousand million dollars, and these farms by the industry of their owners and workers yielded an aggregate annual value of nearly forty thousand million dollars.

In the production this wealth, eight million farmers were occupied, families comprising 30,000,000, making use of five hundred million dollars worth of farm implements.

"The value of live stock on farms estimated in the last 1880 census to be worth over one thousand five hundred millions of dollars, is shown, by the reliable statistics collected by the Department of Agriculture, to be worth now 1890, two thousand five hundred and seven million dollars."

These figures are surely enough in themselves to convince every thoughtful man of the responsibility and worth of the farmer's occupation in contrast with all other industries of the country.

It may be positively stated that upon the productiveness of our agriculture and prosperity of our farmers the entire wealth and prosperity of the whole nation depend. The trade and commerce of this vast country of which we so proudly boast, the great transportation facilities so greatly developed during the past quarter of a century are all possible only, because, the underlying industry of them all, farming, agriculture, has been called into being, even the products of our mines and quarries are only valuable because of the commerce and the wealth created by agriculture.

True that though the country, from time to time, and at all times some parts of this great country, may be depressed in its farming interests. These are not always flourishing. But what other department of business is always flourishing? In all human affairs, "there is a day of adversity set over against a day of prosperity."

But farming is the surest occupation on the earth. There is always something to do.

Ships with their cargoes may sink, warehouses and goods may burn up, mines may become exhausted, oil wells and gas mains may fail, goods may depreciate on the market because fashions change and demands cease, the professions may become overstocked, and men of average abilities are ground between the millstones of too much crowding and too little capacity.

But farming, more than any other business has the warrant of a covenant-keeping God, that seed time and harvest shall not fail, the land needs no insurance, it cannot burn up. It cannot sink beneath the water, there is more certainty in every square yard in farming than in any other business. But it must be valued, and not neglected, it must not be denied.

Mr. Greely used to say: If you take a thousand farmers and compare them with a thousand business men as they come along, they will

possess in the aggregate as much property and do as much good as any class. In the average more streams of money flow from the towns and cities into the hands of the farmers than flow the other way.

Farmers have less to do with notes than any other class. If you go into the commercial or manufactory communities, notes are paying from hand to hand, and from bank to bank, and as a general order, he who goes borrowing goes sorrowing. The farmer can snap his fingers at the bears and bulls at Wall street, banks may shut up, manufacturers may shut up, but they cannot shut the farmer up. Stick to the farm.

INDUSTRIAL EDUCATION.

By Prof. N. S. DAVIS, *Superintendent Public Schools of Lackawanna county*

(Read at Waverly Institute.)

You will see by looking at the programme that the topic assigned me is "industrial education;" a topic upon which there has been more or less disagreement. The term "industrial education," as currently used, means that education on which trains the hand, the eye and the brain to work in unison. Under our present system, the mind only is trained, the hand and the eye are neglected. The questions to be presented before this institute are important to farmers, yet it seems to me that the great question after all is the educational one.

Perhaps some may wonder why such a question as this was placed on the programme at a farmer's institute. I would say that it was placed there because it relates directly to the most important crop produced in his country, that crop of boys and girls growing up in every neighborhood and almost upon every farm. The great questions for discussion among farmers now days are: How shall we make the farm pay? How shall we make the poultry pay, the fruit pay, the dairy pay, etc.? I leave such questions to the members of this institute, knowing well that they are abundantly able to discuss them with profit. In the meantime let us inquire how we may make the boys and girls pay, not in dollars and cents, but in something of far greater value. Parents who have the happy faculty of educating their children in such a way that their mental, physical and moral nature are developed harmoniously, are infinitely better off than the parents who have failed in this and have succeeded in amassing thousands. Who has not seen the son of a well-to-do farmer, strong and healthy, every muscle fully developed, a perfect picture of health and strength, able to go in the field in morning and lead all the rest, no matter what the work may be, yet with a mind only partially developed, his education, as far as books are concerned, neglected. Physically, he has been thoroughly developed, mentally his development has been sadly neglected. Who has not at some time seen the young lady who has been away at boarding school. She can sing, she can play, she can paint. She cannot get a dinner, she cannot make a bed, she cannot mend a stocking. It may be a question whether this young lady has been developed, either mentally, physically or morally; but one thing is certain, she has not been properly educated. There has been too much education of a character that brings about a dislike for manual labor.

The idea that labor is degrading works more mischief than a little among our young people. Industrial education is intended to remedy this defect in our system, and the subject is of sufficient importance to warrant thorough investigation. Several years ago prominent educators began to find fault with the present system. They expressed themselves in a plain forcible way by saying, "put the whole boy to school."

The outcome of this agitation was the establishment of the first manual training school at St. Louis about twelve years ago. How does this school differ from the ordinary school? The difference is just this: The students divide their school hours equally between mental and manual exercises. The manual exercises are for discipline only. Trades are not taught. Articles are not manufactured for sale. The course of instruction in the school room is about the same as a high school course. The shop instruction includes carpentry, wood-turning, pattern-making iron-chipping, forge work, etc. Industrial education in schools is now in operation in most of the leading cities of this country, and in most of them much less than half the time is given to shop work.

Superintendent MacAlister says, "the object of the public school is education in its broadest sense. If industrial or manual training cannot be shown to be education in this sense, it has no place in the public school. We have no more right to teach carpentry or blacksmithing than we have to teach law or medicine.

The supreme end of education is the harmonious development of all the powers of a human being. Whatever ministers to this end is education; whatever interferes with its accomplishment, no matter how valuable in itself, belongs outside the elementary school. The processes of manual training afford a better means of cultivating the faculties of reason and judgment than many things which now find place in the courses of instruction. We do not need to depend wholly upon theory for the correctness of this view of manual training. Men who have had these schools in charge tell us that the manual training so stimulates the general intelligence of pupils that the time occupied at such work more than compensates for the amount of text-book work which it supplants. It would be easy to find plenty of testimony to this effect. The schools of a generation ago were certainly inferior to the schools of to-day as to teaching, text-books and other appliances; but no one will gainsay the statement that they produced men and women possessing a mental and moral force of character quite equal to those of our own time. Is not this largely to be accounted for by the fact that while the advantages were poorer and less time was spent in school, the boys and girls in the rural life which then chiefly prevailed, were brought more largely into contact with things, through work upon the farm and in the home, and their mental resources were thereby increased to a degree that the purely intellectual drill and the memorizing process of the present day cannot yield?

Having defined industrial education in the first part of this paper, and having given a brief account of its status in this country, the question naturally arises: What is there in it for us? Will it benefit our schools if introduced there, and if so, can it be introduced?

Let us look for a moment at the situation in this state. Three years ago Governor Beaver appointed a commission of prominent educators of this state to investigate this matter carefully and report, making such recommendations as they thought proper. The commission after

having made a thorough investigation of industrial education as conducted in this country and Europe, made a report with the following recommendations:

1st. That industrial education be taught in each of our normal schools, and that five thousand dollars be appropriated to each school to establish the plant.

2d. That a moderate appropriation be made to each school district, as shall undertake to establish manual training in connection with the public schools, and that in the erection of school buildings hereafter, suitable provision shall be made for a room or rooms to be used for the purposes of manual training.

3d. That provision be made for grouping rural schools for manual training in such a way that scholars may go in sections from each school to one conveniently located or a special instructor be employed to give to each school in turn.

This statement of what has been done and what has been recommended by a commission, may seem somewhat dry, but it is necessary to a proper understanding of the present situation. I presume that with many people the suggestion that a work bench be placed in one corner of the room would appear ridiculous. But when we stop and reflect for a moment, we realize that after all there may be something in it. Children cannot learn everything from books. A great part of our education is obtained outside of books. The book supplies the theory, but we want something else. Look at the following illustration, and determine for yourself whether there is anything in it of educational value. Take that class of twelve-year-old boys in the country school and ask them each one to draw a plan of a bird-house to be placed about their homes next spring. After the plans have been drawn, let each pupil construct his house according to his own plan. If they go through with this work, is there anything of educational value in it? I believe there is. You will have a variety of plans and a variety of bird-houses. These boys will not be able to draw a single line of their plan without thought; and if we can teach children to think instead of memorizing so much, we have done a great work. In drawing this plan, the boy must use his mind, and if he uses it properly it will grow. He must know how many pieces of wood to use, the size of each one, the slope of the roof, the location of doors and windows; in short, he must make up a plan as the boys say "out of his own head," and the exercise is good for him. Ingenious pupils may plan something elaborate; other pupils something plain.

Then comes the construction of a house from the drawing. As far as he is able, the pupil will do this part of the work carefully and well, and from first to last, the pupil must think. This is true from the first line drawn to the last nail driven.

Now the friends of industrial education claim that when boys have reached the age of twelve years they should be given work of this kind, or something like it. They say that six hours in the school room with only mental work and little or no physical exercise is not good for the student. Industrial education, as commonly understood, will give the pupil physical exercise along with mental work, and this exercise will be given with a purpose. It is easy to raise objections to industrial education. Men will say that the farmer boy has exercise enough, and that is generally true. But do you not see a great difference between the construction of a piece of work like the bird-house and bringing in a pail of coal? There is physical exercise in bringing in a pail of coal

or water, but there is not much development of mind in the operation. Industrial education develops both mind and muscle. Some may say that the exercise is given under the head of industrial education should be given at home. The fact remains, however, that they are not given there. Boys grow up sadly lacking in the use and care of tools. As a rule, what the boy learns about tools and their use is picked up by chance and by stealth. My experience is that the boy who is learning to mow must take the poorest scythe in the lot. The best tools on the farm are kept away from the boy. If he wants to make a box trap or a dog kennel, he is expected to whittle it out with a jack-knife. Now, is it not a fact that boys at ten years of age should be taught to use and take care of tools? If this can be accomplished at school in a systematic manner without detriment to the present course of study, then surely the change would be beneficial.

The useful things that may be taught at the work-bench are without numbers, but a regular system of exercises has been arranged for pupils that will give them a knowledge of the use of tools and will also show clearly whether the work has been done in a workmanlike manner or otherwise. A thorough test of industrial education has been made in Philadelphia, and the superintendent tells us that it is a success. Two years ago there were thirty-five thousand school girls in that city taking regular lessons in sewing. He says, "The testimony of the principals is unanimous as to the beneficial influence of the sewing lessons upon the pupils. They break up the monotony of the school; they afford a pleasant relief from the pressure of purely intellectual studies; they cultivate a respect for the work of the hands; they train to habits of neatness and order in practical affairs, and they confer an accomplishment which every girl will learn to value in after life." It may occur to you that we are now teaching as much as we possibly can in the public school, and that any attempt to introduce more work is ill-timed. We must remember, however, that our present school system is in its infancy. No matter how much we may admire it in its present state, it would be folly to say that it cannot be improved. I speak only the truth when I say that a vast amount of time is wasted in the school room. It is simply impossible for any pupil to devote six hours a day to pure mental work. More variety is needed. The change may be such a one as to bring rest while it continues to educate. Much useless lumber should be eliminated from the text books and something better given. If not industrial work, at least something that will be of practical value to the pupil. Mc Allister says, "It is not our business to train boys and girls to be mere bread-winners, but we must see to it that the education we give to them confers the power to hold their own in the struggle of life upon which they must sooner or later enter." I have no sympathy with those who claim that the public school gives too much education to the masses of people. It is impossible to overeducate any human being. The only question is as to the kind of education that should be furnished. We must train our children to believe in work; to respect work; to seek work.

This should be a part of their education; and the way to do it is not to teach them trades in the public schools, but to broaden the general culture which those schools give, in such ways that the young people shall begin their career in sympathy with the social conditions which surround them. As at present constituted, the schools are directed almost wholly toward a literary outcome. The traditions of the past are still all-powerful in the common school as well as in the college.

We need to make our education more real. In doing this we shall not make it less noble and refining, but we shall give to the children a wider vision and a braver heart, and we shall send them forth into the world better able to deal with the realities of life and to discharge its duties fitly and successfully. Professor Miller says, "When young America is trained for mechanical pursuits under the same roof and amid the same surroundings as he is trained for preaching and pleading; when he is made to feel at school that the same distinction is to be earned by skilful doing as by skilful daring, the necessity for all this talk about the dignity of labor which employs so much of our energy at present will be removed.

And when he acquires industrial skill, not at the expense of his mental training, but along with it and as a necessary part of it, the crafts themselves will assume the old dignity and importance which once they had, but which they have lost in these days of false and foolish artificial standards by which men measure each other." I would not ask anyone to accept the plan of industrial education without consideration. Investigate, experiment and find out if there is anything in it. It is not well to be radical, either one way or the other. We must admit that there are defects in our present system of education. It is not, by any means, perfect. On the other hand, we must not overturn the old established order of things for something new, simply because it is new. Such a complete revolution of teaching as is proposed by the extremists of industrial education should not be undertaken without careful and thorough investigation. That old couplet is a good one which says:

"Be not the first by whom the new is treed,
Nor yet the last to cast the old aside."

This is an age of improvement and advancement. It would be strange indeed if progress were made in all other lines of thought, and teaching itself left at a standstill.

DIFFERENT VARIETIES OF WHEAT AND THEIR FLOUR- ING QUALITIES.

By D. L. ELLIS, *Putneyville, Pa.*

(Read at Dayton Institute.)

The question in subject is one of vital importance to every man, woman and child. Good wheat-bread and butter is the staff of civilized life. Take away wheat-bread from our families for a few generations, and who is so prepared to say that civilization would not glide easily to a state of barbarism. Why could this statement have any foundation or bear any philosophy? Most assuredly it is sound philosophy, because there is no other kind of human food that is so admirably adapted to the development of the human family. Examine the history of nations and study their habits and food; you will find a degree of intelligence standing on the potato; another step higher standing on the hoe-cake; one step higher on the pan-cake; and—head and shoulders

above all—we find the highest order of intelligence, with large and well-developed brains and noble characters, standing securely on the wheat loaf. No other food can excel the loaf which is baked from the flour made from wheat kernels that contain the highest percentage of nutritious substance, because it furnishes more and better brain, muscle, and bone than any other article of food. Consult history and you will find abundant evidence to verify the truth of the statements.

Take the crafty Hindoos, who subsist upon rice. They have never been able to defend their independence against enemies from without, and the truth is, that nearly all ages, and in all climates, the spirit of combine progress and conquest has been most fully exhibited, and has been only permanent in its results among those nations whose principal food was bread prepared from wheat. Progress and conquest have been made, indeed, by nations who subsisted on other foods, but both have proved to be of a more transitory nature.

The chief glories of even the fervid and persistent Scotch were not won until they had added the wheaten food of the English to the production of the barley of their own fields and hillsides. There are examples of this interesting theory everywhere. They are to be met even in the very dawn of history in that first great kingdom founded on the banks of the river Euphrates by Nimrod, two thousand two hundred and thirty-four years before our era. The Chaldeans and Assyrians at Nineva on the Tigris, the two earliest well-organized societies in Asia, the fertile mother of nations, paid in the very earliest times, the greatest possible attention to their vast fields of waving wheat. History informs us that the Assyrian Empire was the most powerful of all antiquity. Their wheat fields demanded even more care than those of the Babylonians; and history has proven their far longer duration as a great power. And so on down we could follow its trace and effects on the inhabitants. When Abraham left Vir of the Chaldees and began that long journey which eventually conducted his descendants into the promised land, and to the conquest of Canaan, there is abundant evidence to prove that wheaten bread or cakes were then an essential article of food for the Hebrews. And no race on earth has preserved its vitality and the intense individualism of its character with half the distinctive force of the children of Israel. Among all these ancient people the millers were always women, and the mills were of a most primitive description. You all, no doubt, can recall the familiar quotation in the Scripture: "Two women shall be grinding at the mill: the one shall be taken and the other left." Your honorable committee may think by this time that what we have been reciting to thus far is not what was expected to be learned on the question in subject. The object in view of your humble servant is to draw the attention of the farmer to a more careful and practical study of the real wants of the human organization. And when the time comes that the great mass of our farmers understand that there is in certain varieties of wheat a combined and well-balanced nutritive value so well adapted to the human organization in forming a supply for bone, muscle, fat, nerve and brain, it will be an easier task to induce him to cultivate that variety. The age has already dawned that a discrimination is placed on different varieties of wheat to some extent for the intrinsic value of the nutritious substance they contain. The farmer, as well as the miller and educated baker, and consumers of bread, is aware of this. Your humble servant could sight you to scores of farmers who cultivate now, and persist in still a continued cultivation of certain varieties

of wheat which is almost entirely void of the most essential nutritive substance, so admirable and essential as food for the human family. And strange to say, but it is a fact, that some of these farmers who produce this variety do not want to, and will not consume a particle of the flour produced from such wheat if they can possibly evade it, and evidently he is so justifiable in not wanting to admit such flour in whole or in part as his daily bread, for undoubtedly it lacks almost entirely any trace of food for the brain; and undoubtedly brain food is what he should have by all means. We in the outset, said that it might be possible to glide into a state of barbarism; and it not so far from barbarism to cultivate a variety of wheat that we know lacks the proper elements of human food and want to put it on the market as such at a full price, while we ourselves will not use it. This part of our argument is not directed to the bulk of our noble farmers who are anxiously seeking for information to place them on the road to honorable success. And we have not the least doubt that success, and abundant success, will crown the honorable farmer, who intelligently tills and cultivates his land and produces the product of his farm of the best possible variety bearing a reputation of an intrinsic value. If any of our eastern farmers are disheartened with your present circumstances, do not despair. Stop; consider; look about you and see if part of the blame does not rest on your own shoulders and doorsteps. Can you not raise a rich variety of wheat at a fair profit at present prices? I can almost hear the ready answer to this question in your minds. It is almost universally, "we cannot." I will not attempt to instruct you how you can do so; as others of ability in this line are so anxiously waiting to explain to you that it can be done. I would like you would indulge me a little and think for a few moments on what some of our northwestern farmers are doing with Scotch fife wheat, a variety which is head and shoulders above most all other varieties, on account of its containing large proportions of albuminoids and plutin. By an experiment conducted by Hon. L. H. Hale, of Herron, and C. E. Bostwick, of Hitchcock, South Dakota, fifty acres of land was sown broadcast, using one bushel of wheat per acre of the celebrated Scotch fife variety. The entire fifty acres lay in one body, and was selected with a view to its uniformity of soil; being cultivated eight years in succession in wheat, without any fertilizer whatever. Twenty-five acres was arranged so as to irrigate it from an artesian water well; which water showed by analysis to contain a presence of sulphur, iron and lime, and epsom salts. The actual cost of production per acre of irrigated land was seven dollars and forty cents, and the non-irrigated, six dollars and twenty-five cents per acre. The irrigated land produced twenty-three bushels of wheat per acre, which was marketed at eighty-five cents per bushel. The non-irrigated land yielded four bushels per acre, and was of such poor quality that it had to be marketed at no grade price, which was fifty cents per bushel.

I quote this test to show that to raise a rich variety of wheat in paying quantities, the soil must contain the proper supplies; and if it does not, it must be put on in some form. In this case, if you figure it out, one system of cultivating wheat gave a net profit of fifty-three cents per bushel, while the other and old system of cultivating wheat, it was produced at a loss of one dollar per bushel. On the soil which this test was made, you will remember that wheat had been grown for eight years in succession without any organic or mineral fertilizer; and the substance which once was there to produce an abundant rich wheat

kernel was exhausted. So it is in any soil. If the proper care and assistance is not given it, wheat of a variety that fills out round and plump on worn-out soil is as worthless in its proper food qualities as a farm which will not produce enough revenue to pay its taxes. But as to the varieties of wheat, I will not attempt to name the many, as there is on record many hundred. We will confine ourselves to a few that are so familiar to us all.

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|--------------------------|---|
| 1. Lancaster Red | } these three varieties will and all do grade |
| 2. Mediteranean | |
| 3. Red Chaff Bearded, | |
| 4. Fultz. | } Long-Berry Red. |
| 5. Michigan Swamp. | |
| 6. Clawson. | |
| 7. Sugar Valley. | |
| 8. Centennial. | |
| 9. Ontario. | |
| 10. Fulcaster. | |
| 11. Michigan White Hard. | |

We might go on and enumerate many others if it was thought necessary, but as the object is to learn what variety is best adapted to our section as a prolific producer and contains rich and strong flouring qualities, we can find this in the number quoted.

The most important feature in wheat culture is to produce a variety which is rich in albumen and gluten. It is the large proportion of this substance in flour which regulates its value, examine the markets; see always that the highest market prices are on flour manufactured in the northwest—Minneapolis, Duluth, St. Louis, etc. Why is it that their flour is anxiously sought after in all flour markets, even to Europe? Their flour and wheat is both head and shoulders above all others, because it contains a large percentage of albumen and gluten, and makes more bread, better bread and richer bread than that from any other section of our country. Do you ask what this substance is, and do not all varieties of wheat contain it? Ah! This is just where the largest majority of our farmers, millers and domestic bakers are in darkness. If we all had a reasonable knowledge of the chief constituents of the wheat kernel, and what varieties contained the best average proportion of the same best adapted to the human family as a principle food, and especially the baker; if they would study the analyses of the substances in their original state, and the chemical changes that takes place in the process of fermentation of the sponge and baking of the bread, we would all be a happy trio. But as it is, you are aware, the routine goes; the wife or daughter complains of the bad flour and miller to the husband or father; the latter pours the double oath on the miller when he meets him, and is not in a good mood to receive any explanation that would, in most cases, exempt him from all blame. But come back to the question, the wheat berry; so composed of—as its chief constituent—starch, gluten, albumen, saccharine matter, gum, sugar. Superphosphates of soda, lime and magnesia, also nitrogen, is traced out in analyses. We will not attempt to explain all the different component parts and their influences, as this would consume considerable more time than could be allotted on an occasion of this kind, but you will please indulge me in a little time in which we will confine ourselves to the albuminoids, or glutinous matter, and its influences, and starch and its influence, and changes

to which it is subject in the usual process of baking. All this will be sufficient to show that a proper percentage of gluten is absolutely necessary, if good, wholesome and nutritious bread is desired, and when we fully understand this, it will be but a few moments' work to decide on the proper varieties of wheat to adopt in our culture.

Gluten bears a pale yellow color, is adhesive, and of an elastic nature. It is insoluble in water, alcohol or ether; neither in oils, fixed or volatile. It is soluble in dilute acids and alkalies. It exists in various quantities in most farinaceous grains. It is accompanied by albumen, which bears a brownish color, before coagulation. Albumen is soluble in water. By heat it coagulates, and is insoluble in water, but dissolves in caustic alkalies. Most of acids, if added to its solution in excess, precipitates compounds of acids respectively with the albumen, which, though soluble in pure water, are insoluble in that liquid when acidulated. It is not, however, precipitated by an excess of phosphoric or acetic acid. Its relation to the metallic salts are similar to those of gluten. As we stated before, it is associated with gluten in wheat and vegetable juices which coagulate by heat. The mixture of vegetable fibrine and albumen which constitutes gluten exercises an important influence over starch, which, with the presence of water and acid of moderate heat, it converts partly into gum and partly into sugar. It is all important that the gases which generate in the sponge, while in the several stages of fermentation, be retained. This gluten is what gives the sponge an elastic nature, capable of expanding to a large proportion with an almost air-tight surface and a light porous interior, full of the proper accumulation of acids and gases, which, when baked, yields a light, white and spongy loaf. If the proper amount of gluten does not exist, the result is that the gases are not retained, and, before a light, spongy sponge is produced, the stage of fermentation has gone too far, and a portion of the starch has been converted to such a state as to create a substance called dextrine.

The nature of this substance is gummy and when fully developed is of a brown or gray color and very close and solid, resembling somewhat in appearance a carpenter's whet or oil-stone. No doubt many of you have heard the servant maid say in reference to bad bread: "I, or we, are getting tired of eating whetstones;" or, "here the kind of whet stones the flour makes that we get at so and so mill; that miller can't make flour fit to eat," etc. Where, if the party had a knowledge of the true facts in the case, the miller's reputation would not have had to bear the blame, but as we are not appointed on this occasion to shield the miller from the fiery darts of the wicked, we will return to our subject, and proceed to classify the varieties of wheat according to their value as good bread producers.

The three first named, Lancaster, Mediterranean and Red Chaff Bearded, come so near an average in albuminoids and gluten that they can be placed in one class. The Lancaster Red, however, is the choice of the three, and is highly recommended. Samples of it being tested showed a presence of twenty-five one-hundredths albumen and gluten. And when first introduced into this country it proved to be a very prolific producer, well adapted to our climate; so much so that many of our farmers adhere to it to the present time. And the writer has, as late as five years back, milled of this variety that yielded thirty-five bushels per acre, not more than thirty miles from this place. The species we have of it now is not, however, what it was

in its original state, as it has deteriorated by hybridizing with poor varieties.

4. The Fultz wheat is largely grown in this state. It can, at present, be classed as a medium variety for milling and flouring purposes. It is a variety that improved in quality of gluten and albumen since its arrival with us, ten to fourteen years ago. It was low in gluten and albumen when first introduced into some of our eastern counties. In its first original state it was found to run as low as four and one-half to six per cent. in albumen and gluten. Several large mills suffered heavy loss by milling it for their market or trade, so much as to lose their entire trade. The writer had the honor of being on the state committee of the Millers' State Association, for inspection and grading grain for milling purposes at that time, and tests of the Fultz then showed, as I stated above, to contain as low as four and one-half one hundredth to six one-hundredths gluten and albuminous substance. In the markets then it rated from ten to fifteen cents per bushel below Lancaster Red, and notwithstanding the vast improvement it has undergone since then it is still below par. The large mills, which are compelled to use it largely in manufacturing flour find trouble to market their flour in localities or markets where flour is put which is made from the richer varieties of wheat, so much so that many find it necessary to buy strong, rich, spring wheat to mix with their own product to raise its standard to a reasonable comparison.

5. The Ontario is a variety not largely adopted as yet. Its intrinsic value as a flour producer averages with the Fultz, with a balance in its favor in gluten of a small amount.

6. Clawson; 7. Sugar Valley; 8. Centennial; 9. Michigan swamp. All four of these can be classed together, and multiplied by hundreds or more, if you choose, of the same substances class; and then you could find nothing in their favor as a wheat for flouring for the market, as the albumen and glutenous matter run very low in all of them, and what is found is of a poor quality, and has not got the elasticity and insoluble qualities which is indispensable when good bread is desired. These are some of the varieties which produce a flour which even some that raise such wheat despair of eating any bread made wholly from it. With a scientific baker, who understands handling weak flour and understands the chemical changes which acts on the starchy portion that readily converts to dextrine and makes a heavy black loaf, can, by careful management and use of drugs, produce a fairly light and respectable loaf, but must be used when fresh or not at all.

Draw your own conclusions. Is it what we want or is it not? The unanimous cry should be "away with them; give us something better." If this is your decision, and I sincerely hope it is, we will refer to one that is better.

9. Fulcaster. This is a kind that has been introduced lately into our locality and bids fair to become the leading variety. It finds its place, in flouring qualities, next to the first named, and derives its name in part from it, viz: Caster; it being a production from a careful crossing of the Fultz and Lancaster, for, I believe, seven years prior to its appearance in the market. It can be said of it that it comes next to the Lancaster in richness of albuminoids and glutenous matter; and is said, and proven, to be a prolific producer. The author of it claims to have raised, on small plots, an average equal to sixty-three bushels per acre. Is this not encouraging? There should be a pin stuck in every farmer's tally board at those figures. Sixty-three bushels per

acre! There is pounds, yes tons, of food for thought between sixty-three bushels per acre and what the average farmer gets per acre; but as I am not detailed to inform you just what to do to bring your farm up to such a state of high cultivation as that, I will not dwell, but will inform you that the first Fulcaster wheat ever milled grew thirty bushels per acre on a fifteen-acre lot. This dates four years back; and if all our farmers could get their fields that are naturally adapted for wheat culture up to a fair state of cultivation, you can all do as well, and no mistake. I don't think that most of you have ever realized the height which you might attain in this line. It would seem to me that the farm which has the natural features of a wheat farm, facing the east or morning sun, etc., natural limestone land, that thirty or forty bushels or even more, should be the usual crop per acre in, or on, favorable seasons.

In conclusion, we will say that, from a practical and profitable view, we should discard all varieties of wheat except the best; and from these numbers select not more than two or three varieties at the outside. One is enough, and has been in former days proven to be more profitable than more. Go back to our fathers' days. Did they have such numberless varieties as we now cultivate? Did they raise more and better wheat than you now raise? Was there not, in those days, more farms cleared of mortgages by money realized from the crops? Was the price always higher than the range of prices now; or did not some of our fathers start poor and sell wheat at fifty cents per bushel and pay for their farms? Some of the older of this assemblage can answer this correctly. I can remember hearing my father tell of milling flour in Indiana county and shipping it to Philadelphia, and the price ranged from three dollars and a half to four dollars per barrel. You say the land was new and fresh then. We admit it; but has it not been proven by actual test and experiments that old soil will produce better crops if kept in the proper state of cultivation? Then if this is a fact, who is to blame? If we cannot make a living, and pay our taxes, and keep our fences up, and fence rows clear of briars and all sorts of rubbish, there is something wrong; and we are fully convinced that part of the wrong exists is a neglect in allowing our wheat culture to drift gradually down in both quantity and quality. And, in conclusion, if my advice is of any value, you have it in this form: Select your best field adapted to wheat culture, in view of the morning sun, protected from the north and northwest winds, etc. Raise the state of cultivation of the same to a high standard. Select your seed from one of the two varieties, viz: Lancaster Red or Fulcaster. Be sure your seed is pure, and keep it pure. Exchange of seed, often if brought from eastern or northeastern crops is said to be of great advantage. And you should not be satisfied until your yield per acre will average thirty bushels at least. You need not have the least particle of fear of lower prices on account of an over-production. If any of you have fear in this line, look up your old memorandum book, and see how prices ranged in the years 1854, 1855, 1857 and 1864; the wheat crop was the largest ever produced up to that date. Later yet, in 1879, you will find that the crops, in proportion to the population, was the largest that ever was known. Yet your price was twenty per cent. above the preceding year, and higher than any subsequent year, with one exception. Good wheat, sound, plump and well cleaned, of a good variety, is always in demand at the highest market prices. And success in farming, as well as milling, depends on good wheat. No man can mill

a poor variety of wheat and market his flour. And if the miller or mill owner cannot market flour, the farmer cannot his wheat. The farmer and miller are in the same boat, closely allied. I cannot see how so much enmity has crept in between us.

We must work to each other's interests if we desire success. Then, if we are so closely allied, let us have harmony; let us consult one another's interests; let us recognize each other's rights, and be content to live together in peace and harmony. Remembering that judgment is fixed; house divided against itself cannot stand. Then where we will land, who knows? We, as millers, may have to engage in the tilling of the soil, and then we will all be farmers. Then there is a worse feature than the change of the present miller to a farmer. Might it not be said again, "Two women shall be grinding at the mill; the one shall be taken and the other left." Moral: Wife, daughter and sister, persuade your husband, father and brother to cultivate Fulcaster and Lancaster wheat, and none other.

A PRACTICAL EDUCATION.

By D. M. BRUNGARD, Esq., Lock Haven, Pa.

(Read at Lamar Institute.)

We live in the grandest age that has ever dawned on a people. To a great extent it is a utilitarian age. Every field of human action is pervaded with the spirit of utility.

Our schools are frequently criticised on account of the work performed in them. The boy enters school at six and spends eight or ten years, often irregularly, within its hall, then passes out into the broad and busy arena of life, to fail or succeed. Should he succeed, little of the success is attributed to the training and teaching received while attending school in the little school house on yonder hill-top or down in the valley by the silver stream. Should he fail in being successful in his chosen calling, censure, keen and sharp, is visited on the heads of those to whom his early school training was entrusted, because he was not better fitted for the discharge of his duties. In a measure, we are obliged to give respect to those opinions and criticisms. Our boys too frequently leave school unprepared to cope with the business pursuits of life. But shall all this censure and criticism be visited on the heads of our teachers, and they not allowed to remonstrate? Some *may* remonstrate, the many may not, *must* not.

Charity, brethren. Let us look into the history of the past and see what a sad scene of darkness is revealed. Men have always been possessed with all the mental faculties they now have though often undeveloped, unaroused and inactive, hence the reign of ignorance. For nearly a thousand years prior to the reformation ignorance was the rule and intelligence the exception. At first the light of education shone dimly, like a small taper, from out this almost Stygian darkness.

The light of new centuries slowly added increased lustre and beauty to it until it has acquired its present magnificence. In those days of

darkness barbarian hordes overran, devastated and destroyed almost every vestige of science and learning, found in the principal seats of knowledge throughout Europe and Asia. Nations were convulsed and ruined; learning set at naught, and moral principles trampled upon. Emperors, kings and princes knew comparatively little of the arts and sciences. Writing and literature were the acquirements of the very few. Kings, and those in authority, in subscribing to documents, used the sign of the cross, a thing not unusual at present. As the generations of man die and pass away each succeeding one improves in the development of the other until we, who live in the last decade of the nineteenth century, recognize the potency of the influence wrought upon our children who attend school in the city, village or hamlet. It is there our children acquire that which makes them greater, better and more useful to home and nation than were the kings and lords of long ago. There is still much darkness. We deplore the fact very much. But to-day the gates of the temple of learning are open to all regardless of lineage or dollar standing. The treasures of knowledge may be explored by the humblest, assimilated, and become part and parcel of himself. In this age of public schools, normal schools and colleges, inventions, useful and otherwise, abound plentifully as the result of the thought training acquired in their halls. Gallileo, Newton, Whitney, Fulton, McCormick, Morse, Field, Edison and others have all followed successively in the wake of the practical in education. Each has given new impulse to the other, opening the way for more extended communication of practical knowledge to every rank in life. The stream of the practical in education is widening and broadening to all orders and conditions of society, and will continue to flow on until all mankind shall be filled and satisfied with its fullness.

Ignorance is growing less with each passing year; the enslaved have the bonds cut asunder, and walk in the marvelous light of liberty and freedom. The mass of humanity are beginning more and more to assert those rights and privileges to which a loving Father entitles them as beings of his design and creation.

The improvement and development of the coming man is studied; inquiry and investigation are stimulated to bring about all the usefulness and happiness to which he is susceptible.

The home, the school, the church, the state, must supplement each other if a still better condition of things is to be achieved. In 1880 there were in the grand old Keystone state 146,000 persons over ten years of age who could not read. By the same census there were in the United States, 1,908, 801 voters who could not write.

This needs no comment. No logic is so convincing as the logic of results, of actual facts. This is a government "by the people, of the people for the people," and we grow eloquent over our greatness, our glory and our power.

We are Americans by birth or adoption, proud of our broad domain, our government, our institutions of learning, but still look at our brother man with a feeling and sympathy akin to pity when we see how he is bound and fettered with the shackles of ignorance; led to the polls to exercise the right and prerogative of suffrage, often as dictated by some unprincipled demagogue or political trickster.

We want schools, an education whose aim and accomplishment shall be the regeneration of the community, state and nation. The present demands more of us than the past did. The school must mean more, do more and better work.

It must be practical indeed as well as in theory. It must mean the education and development of every capability possessed by every child. We owe this to every child. Every child must be made a student, thinker and reasoner.

Farmers, mechanics and toilers in every honorable calling must think intelligently if they would toil intelligently.

That mental discipline acquired through well-directed study, trains the mind, strengthens the mental fibers, develops concentration of thought and enables the toiler to do his work more easily, thoroughly, and with less friction.

But we must deal with things as they now exist. The past is past, we live in the present, and should earnestly strive and hope for the future. Even with present conditions and facilities it seems much more might be done in the practical in education than is done.

From observation we are sometimes led to infer that either the studies employed in our schools are not adapted to give proper mind development, or the methods employed are very imperfect. It is most self evident that practical teaching will give the boy a practical education.

Patrons and children clamor for the more practical in education. We need an education that has for its object the better preservation of our lives. Practical in this, that we not only know the right but execute the right in subserving that preservation. We need an executive knowledge in the better development of our muscles, the sharpening of our perceptive powers, and the greater quickening of our judgments.

Without these the parental, the social and industrial activities all suffer more or less. We need an education that will teach us that when the body is fatigued, we desist from labor; that we eat not unless there is a craving for food.

The importance of a more thorough familiarity of the laws of physiology and hygiene are underrated by many people. How many people at forty years of age are in good health? Right knowledge, impressed in the right way, would result in much good. The ornamental in education, in many instances, crowds out the useful.

In this life our mission seems to be to produce, prepare or distribute the commodities of earth. Our schools do not recognize this fact or condition as it merits.

Why not present the lessons of school and home as the lessons of life will be presented? But here I find this obstacle or difficulty in the way: too many *untrained* teachers. Happily, however, each year gives us better trained and more practical teachers. The untrained are growing fewer in number as the years pass by, and justly so. Your legal adviser must be well trained in some good law school; your medical adviser in some reputable medical college; otherwise you refuse to recognize them.

There must be no uncertain tone when life and moneyed interests are at stake.

But how and what, when the body, mind and soul of your boy are at stake? The success or failure of that boy will depend largely on the nature of the education he receives. The man or woman who shapes the destiny of my boy and your boy must needs have the best of training.

Do you see it? Not any one may shoe your horse, build your barn,

till your soil, until you are well satisfied that he can do it well and skilfully.

Oh! the blind, the lame, the halt, threading their way down the avenues of life's pathway, miserable in body, mind and soul, and all because somebody was indifferent—couldn't see it—didn't want to see it.

Young man, if you deplore lost time spent in praising and analyzing "Thomsons' Seasons," it is not your fault—not the author's fault. If your knowledge of spelling does not help you it is not Webster's fault. If your arithmetic is insufficient for every need, it is not what you were taught, but what you were not taught that must be censured. It is not nature's fault, not all yours, nature has done her part, and you did yours as well as you knew how in the light of the knowledge possessed.

You imagine I mean the teacher, do you? I do. But permit me to say that the teacher is human in all points as we are. The same considerations that affect you affect him. He says his tenure of position is uncertain, his salary is often times meagre. He doesn't care as much as he might. It's his last term. He takes all he can get and gives what he must. Next year a new and, perhaps inexperienced one tries his hand. He needs money to prepare his way to some other profession. He teaches a few years. Leaves the work. Some one else takes his place, and so on *ad infinitum*. The boys come and go. Finally launch out into life's great field of labor, poorly equipped. Not much knowledge. Poorer yet in the acquirement for thought power.

A proper education is the only power that can reach down to the lowest condition of man, lift him up, and place him on a rock that is higher than all else.

By design and creation he is a little lower than the angels. The most must be made of him. To develop a noble manhood and womanhood should be the guiding principle of every teacher's heart, regardless of a moneyed consideration. Where parent and guardians send the boy to school, see to it that a man or the nearest possible approach to a man is made of him. Parent, teacher, do you see the greatness of the responsibility? Do you see the need of a better preparation on the part of many of our teachers? The plowman who would succeed, must be wider and deeper than his furrow.

Teaching and learning the seven arts, reading, language, numbers, writing, drawing, music and etiquette is not the sum total of a practical education. The knowledge of general application of all things to all things must be studied, taught and learned as well.

Some one says. The chief curse of man is his effort to avoid labor, therefore introduce manual training into all our schools and you will secure the practical to our boys and girls.

Manual labor is eminently respectable. There is nothing degraded or undignified connected with it. To say so in word or act is an insult to talent and industry. We are all dependent on labor; and should bow our hearts in humble deference to the laborer. But labor must be supplemented with a liberal well-directed education; the one must subserve the other. Educate the boy so that he may adjust himself to almost any line of work. The better we educate him—the whole boy—the more independent he becomes; the more respect he commands of and from those who employ him; it makes him self-helpful; it deepens and broadens his character.

Some one, no doubt, may be censurable for the turn a boy takes in selecting a life pursuit. Consciously, or otherwise, he may have been

taught that respectability follows only in the wake of certain pursuits, forgetting that it is just as genteel and respectable to follow the plow, forge the iron on the anvil, build a barn or dig in the mine as to pursue one of the professions, clerk in a store or in a railroad office. The teacher or parent who says to sturdy John that plowing in yonder ten-acre field is beneath his dignity, or to rosy-cheeked Mary that washing and drying dishes, and assisting mamma in the kitchen is not becoming a girl of her powers, is not worthy the name teacher or parent. They may advise to attend college and seminary, but must not alienate education and honest, dignified labor from each other.

Hope, happiness and usefulness are blasted through the influence of such teaching. Couple a fair common school education with a boy in any honorable pursuit in life and you make both eminently respectable, and consequently happy. Teach the three R's, the arts and sciences well and skilfully; but with all your teaching forget not to teach economy, temperance, industry and honesty. So long as book knowledge is preferred and used in preference to fact knowledge, so long will a practical education to all in our schools be impossible. The mind must make what it receives, its own. Examples must precede and laws follow; the easy must precede the difficult; and the concrete the abstract. Education must be fitted to the child and not the child to education. The farmer never fits the horse to the harness, but always the harness to the horse.

Train the power of application in every child most carefully on account of its great importance. The hours spent in thinking over a difficult problem are not misspent. All cannot rise to the same plane. It is not so in nature anywhere. The same end in the same degree cannot be reached by all though we are born free and equal before the law. In mind we are not born free and equal. Hence the necessity of every teacher understanding the science of mind. A clever knowledge of the nature, powers and processes of mind is essential to those whose duty it is to train and develop immortal souls for this life, as well as that which is to come. Everything comes through the mind. The hand, the foot, the eye, the ear, the whole man, is trained through the mind, the medium of intelligence.

The causes why many leave our schools without acquiring what we consider a practical education are many. The means appropriated for bringing about a better condition of matters in our schools are insufficient. The facilities for better work are not at all ample in many instances. Irregular attendance of many children. Want of co-operation on the part of patron and teacher, and teacher and director.

What was sufficiently good enough for us is not adequate for our children. We do not believe it for we do not exemplify it in our course and conduct of life. In reaping the golden harvests when we were boys we used the sickle and grain cradle. Why not use them now?

My friend, let us be honest and candid in the matter. We are not sufficiently interested in the children as we should be. Our interest in the matter of their educational training is, perhaps, somewhat superficial. I have known a man to build a two-thousand-dollar barn and then grumble like a Turk because the district school board erected a school house costing only half the same amount. That same character will pay thirty dollars a month to some trustworthy man to drive his magnificent team of bays, but will reproachfully speak un-

pleasant things of the men who pay a teacher the same amount for teaching forty or fifty school children.

Let childhood be well taken care of. It is the formative period of life. It is right to have finely furnished homes, sleek horses, mowing and reaping machines, etc., etc., but let us not be unmindful of the children. Give them the best teachers that can be found in the market; good school houses well supplied with all needful apparatus; encourage teacher and children by prayer and deed, and soon thrift, contentment and happiness shall dawn in upon heart and home. The practical in education will have been realized.

And now, in conclusion, let me say, encompass the whole with the strong claim of good character. It is the essential thing in the make-up of every child's education. Some one has beautifully said: Character is formed by habits, habits by repeated actions, and actions result from awakened feelings. This best part is too much neglected in home and school training.

May the true and good be kindly touched in every nature by some master hand so that it may unfold itself, shedding forth in word and deed all that Paul gave utterance to in one of his beautiful exhortations: "Finally, brethren, whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report, if there be any virtue and if there be any praise, think on these things."

HOW TO MAKE FRUIT CULTURE PROFITABLE.

By D. K. LAUBACH, *Fairmount Springs, Pa.*

(Read at Benton Institute.)

In looking over the subject we feel somewhat like Rev. Dewitt Talmage tells us he felt when he wrote his first composition, he took the world for his subject; he said he did not know what to do with it, there was too much of it, and the more he thought about it the bigger it got. So it is with us, for at one time one third of the male population of the whole world was engaged in fruit culture, for we read that "Cain brought of the fruit of the ground an offering unto the Lord."

But we shall confine ourselves to a few plain practical thoughts on this important branch of our national industries and if we shall be able to so present them as to profit any one we will feel amply repaid for this paper.

In the first place or the first question is what are we going to raise fruit for? Is it for our individual use or for market? Now, in answer to the first question, we hold that if a person is going to grow or cultivate fruit for his own use, or that of his family, then the appetites of himself and family are paramount, his own table and not another's is to be consulted, and he should make his selections accordingly. But if he is going to cultivate for market, then the market which he wishes to supply must be consulted and whatever kinds are most needed, or will pay him best are apples, peaches, or small fruit, or all of them, but the selections must be made of such varieties as his soil will best

produce, and none others and then every energy must be made to their successful cultivation.

Now right here let me urge upon you, fellow farmers, the great necessity of making the right selections, those that produce well in your soil, and sell readily in your markets. Not from some beautifully illustrated plate book or the siren voice of some agent. It is said there was an island somewhere in the Mediterranean Sea on which the Sirens lived who sang so sweetly that any one hearing them became so enraptured that they forgot their own home and were lost and never returned.

Now what we mean is that a great many or the majority listen to the oily words of some agent, and become enchanted so over his beautiful descriptions, that they forget their own business and put down just what the agent tells him. Now we hold that in making his selection he should have consulted some successful fruit grower.

This was forcibly brought to our notice by a German who was riding with us when Squiers, the "peach tree man," drove by, and our friend remarked, "Dot man ish von tam humbug, he humbug every bodies in dis country, and he humbugs me do; he comes to mine house und I vas mad ven he com, und I say I vonts nothings to do mit you, but before I know it, he had me down for eleven dollars worth peach tree; dot man does me not von bit goot." And indeed he did humbug the people for he had a delivery we have been told of eleven thousand trees (principally peach) the next spring. He represented that he had a few new varieties of peaches that would stand our northern climate. Such as the Canada Snow, Old Mixon tree, Crawford Late and Early, etc., etc. Now all these varieties we had tried a quarter of a century ago. And had found by experience that growing peaches in our section was a thing of the past. Now we have given this instance to show you the great need of relying on your own judgment or on that of some one you can depend on and not the "middle man." "His is not to do and die, but to make money," or as was said "to get the tin."

Now we have had little or no experience, comparatively speaking, in the culture of small fruit, but believe it can, from what we have heard from others, be made quite profitable. We have tried various, or several varieties, of grape but the Concord is the only one that seemed adapted to our soil, and does very well and sells readily in our market, and we have confined ourselves to its cultivation only until we find a better, although we cannot recommend it to you for it may not be adapted to your soil or market.

We wish to call your attention more especially to the culture of the apple in which we have had the most experience and indeed it seems to be the fruit of fruits to us all. It is a common thing to locate an orchard by the buildings but if I had mine to replant, I would set it away from them on account of the poultry.

Now in making selection of apples, great care should be taken to get those that produce well in your soil and sell readily. We would not advise the growing of much summer or fall fruits only for your own use, unless close to market, or so close that you can or that it will pay to haul them to it. Otherwise they are a failure. We think in this locality winter varieties are by far the most profitable, or at least such has been our experience.

Another important thing in the culture of all kinds of fruit, is proper care, the loosening of the soil around the roots, ridding them of their

natural enemies, borers, caterpillars and worms and insects of every description.

We will first speak of the borer whose greatest depredations are on young trees (like the great enemy of man who always chooses the young for his prey), and like him, none are exempted from his destructive ravages, apple, pear, plum, peach, quince, and, in fact, every kind of tree bearing fruit fare the same.

The larvæ is deposited in the bark under the outside covering near the ground, in June and September, by a beetle, where it speedily hatches and then commences to work its way to the wood and then to girdle the tree by passing around it in a downward direction, grows rapidly, and at a certain age turns upward and inward until he is about eight or ten inches, above the ground he now approaches the bark, cuts almost through it and then backs into the open chamber where he transforms into a beetle, passes to the thin bark where he has but little trouble to make his exit, flies away a beautiful bug or beetle, with bright stripes one on each side, and one on the back (if we remember rightly), seeks a partner, deposits its eggs (which in turn repeats itself, flies around awhile and dies.) I here present you a sample of his workmanship.

We will now speak of the Oak worm which is of the borer family, but of different habits; he goes in the branches and we have found limbs with forty-six almost full-grown apples on, which had been cut off by it. I here present you with a specimen of its workmanship too. It commences and goes directly around the limb underneath the bark and slightly in the wood or leaving a very little of the wood to the bark, so that when he is around the wood except the part spoken of, is all cut off ready to break at the slightest wind, it now start up the limb in the heart where it lives a short time, then transforms as before described, passes out where the limb broke off and flies away. We cannot describe the beetle, never having seen one, but the first or the borer we kept in our study until he made his transformation.

We will now say a few words about the caterpillar which, like the borer has several families, but all feed on the leaves of the tree, and in this way do great damage to the life and health of it. The first to appear in the spring is what we term the old apple caterpillar, which comes in this section with the first warm days of May. The larvæ having been deposited in a comb on the end of a limb by a brown miller the summer before.

When first hatched it is very small. It now goes down the limb to a crotch and here commences to build its house by spinning a web from which it sallies daily and feeds on the tender leaves and blossoms, and as they grow they build their house larger, and when they get their full growth they creep away to some secure place where a sort of sleep or stupidity comes over them, and some unseen process causes a web or cocoon to form around them, and they are a chrysalis which in about two weeks breaks open and a brown miller comes out. Last summer we shut two or three in a match box and had the pleasure of watch the change. It now seeks a mate, lays its eggs, sports around awhile and dies.

There is another kind that makes its appearance after the leaf has its full size and like the former it is deposited by a brown miller with green edges on its wings. Their manner of work is also different. They commence on the top of a leaf which soon dies, it extends its web wherever it feeds, and many times covers the whole tree. They made

their appearance first in this section a few years ago on the wild cherry and black ash only, but have extended to peach, common cherry and apple, and in fact almost every kind of tree. Last summer we saw a wild cherry, common cherry and an apple tree all covered apparently by one nest and every leaf taken off and the grass at the butt of the trees eaten. Either kind is very easily destroyed at first by taking off the dead leaf or the little nest in the crotch of the tree, when they are not at work and placing the foot on it. The last named seem much the worse pest.

We might, if time permitted, speak of the curculio, the great enemy of the plum, the black knots on the cherry and other topics, but fearing that we may have taken so much of your time already we will close by telling a little story we once read. But do not serve us like a friend of ours said he was served once. He was considered a good talker and began his lecture by telling the story of the boy that drove the nails in the post for his bad deeds; after he told it a little boy back called out, "ha! mister, that is too thin. We have heard it before." It raised the laugh and so took down the speaker that he could not do anything at all.

A father gave his two sons, James and Henry, each a beautiful apple tree and a place to plant them as their own. James immediately began to bestow all his leisure time on his tree, keeping the soil loose around the roots, clearing it of insects, etc., and was soon rewarded by seeing his tree well loaded with nice large, fine fruit. But Henry, on the other hand, spent all his leisure time at the smith-shop pitching quoit, or loafing in the store rooms. One day he happened to go by James' tree and saw it loaded with such fine apples, when he said to himself, why I have an apple tree too, and hurrying to it expecting to find it loaded with fine apples too. When, lo, to his great surprise, it was scarcely any larger than when he set it out, a large worm nest was on it, and they had eaten all the leaves off. He now hastened to his father and accused him of partiality to James and that he had given him a worthless tree, and claimed that James ought to divide. Thus it is, and will be, two men will set out an orchard side by side, one, like James, will devote his leisure time on his, the other, like Henry, will spend his leisure loafing, and at the grog shop and forgets he has an orchard, until he sees his neighbor hauling off load after load of fine fruit and returning with his pockets full of cash. When he goes to his trees expecting to find them full of fine fruit too, but finds them covered with the same kind of fruit that Henry did and like him, begins to blaspheme his Heavenly Father because he does not bestow his providences alike. Hence, from what we have said, we deduce the following:

That in all successful fruit culture:

First. The object.

Second. The kind.

Third. The proper varieties.

Fourth. The proper location.

Fifth. And most important, proper care and attention.

Sixth. That we urge upon all of you fellow fruit growers the necessity of a united effort to destroy all natural enemies of fruit growing.

THE CARE OF POULTRY.

By Miss M. ALICE MEYER, *Clintondale, Pa.*

(Read at Mill Hall Institute.)

I have chosen this subject, not because I know all about it, but because I want to know. I have been studying theories, but have not had the necessary experience to prove them.

I will try to give you the results of my investigations, hoping to gain from you more information than I am able to give.

There is no other department of farm industry so generally neglected as the poultry yard. Perhaps if the farmer were better acquainted with his feathered friends and knew what business capacity they were capable of developing he would see to having them properly cared for.

Both the flesh and eggs of poultry are standard articles of food, for which there is a constant demand. In order to meet this demand three million dollars worth of eggs are imported every year from Germany, beside large quantities from China and Canada. Of these imported eggs, five out of every dozen, it is said, are unfit for use.

All who know the difference between a fresh egg and a stale one will agree that it would be much better to patronize the American hen and give her a chance to supply the market with fresh eggs.

There is ready sale for both fowls and eggs if they are sent to market in the very best condition. The secret of success in the poultry business is mainly in the amount of care given to it.

The care of poultry should really begin before we have the poultry. If our premises are infested with rats, we should first get rid of them. Many a farmer's wife has learned from sad experience how destructive they are, both to eggs and to young poultry.

Comfortable quarters should then be arranged for grown fowls and for little chicks. Many people build their hen houses as if they thought it was going to be summer all the year round. The place that is enclosed for them may seem a perfect paradise for poultry through the summer months, but with two feet of snow on the ground and the thermometer below zero, we get a better idea of what is lacking to make the fowls comfortable through the winter. We should plan the house on a real cold winter day, and then strictly carry out the plan, if it is put up on the hottest day in summer.

We also need to provide a good supply of feed, then we are ready for our poultry.

The Brahmas, Langshans, Cochins, Wyandottes and Plymouth Rocks are recommended as the best breeds for general purposes.

Now, if we are going to care for our hens intelligently, we must study them. We find that each hen is in herself a small mill with a grinding capacity equal to any grist mill in the country in proportion to the size. To keep the grinding apparatus in repair, we must provide plenty of gravel, sand, broken crockery, cinders or crushed glass.

If we want to get our hens into condition for market, we give them all the flesh and fat-forming materials they can use, but if we expect to produce eggs we must feed differently.

In order to give the proper egg-forming material we must know what an egg is composed of. We find that it has a larger proportion of water than of anything else. The white being composed of eighty parts water. We see the importance, then, of keeping them supplied with

plenty of good, fresh water. The white of the egg also contains fifteen and one-half parts albumen and four and one-half parts mucus. The yolk consists of water, oil, albumen and gelatine.

The following bill of fare is recommended as the best for forming the interior of the egg: For breakfast, one part meal, one part shorts and one part wheat bran, mixed with milk or water. It should be given warm in winter, but never enough of it to satisfy the hens. The main part of their breakfast should be wheat, or a mixture of grain put into straw, chaff or old leaves to keep them busy through the day. We find hen nature is like human nature in this respect, that they are both healthier and happier where they make a living by their own exertions, or, in other words, when they scratch for a living. This exercise is very necessary to keep them in good condition in cold weather.

After their day's work is done they should be given all the corn they can eat, without having to scratch for it. They should also have an occasional feed of vegetables and meat scraps.

Oyster shell is recommended as the best material for forming the shell of the egg. Egg shells, burnt bones and lime are also good.

A very important point in the care of poultry, and the very best preventive of disease is attention to cleanliness. The poultry-house must be kept clean and free from vermin.

It is in raising young poultry that the greatest amount of care is needed. But there is a great deal of pleasure in it to make up for the extra care. Nothing can be prettier or more interesting than a large flock of little chicks or ducklings. Yet thousands of them die every year through ignorance and neglect, as well as from disease and accident.

The poultry raiser can expect to meet misfortunes all along the line of operation, from the setting of the hen to the marketing of the chicks, but with proper care, many of them may be avoided.

There has been such an amount of evidence brought in against the hen as being unreliable and unfaithful in hatching out the brood, that she is in danger of having this part of the work taken from her and given to the mechanical hen, called an incubator. It is claimed that this machine does as good work as the best hen can do, and that it will do the work of fifteen or twenty hens without half the care.

Whether we use natural or artificial means in bringing out the brood, it is well to have a large number at one time. It is as easy to take care of a hundred or more as it is to take care of ten.

Until the little chick is twenty-four hours old, it needs no care, except to be kept warm. After that both the temperature and the food need constant and careful attention.

For the first three or four weeks of the chick's existence it should have a very little space outside of the mother, but may be given greater range as it grows older. Plenty of heat, and at all times, is very essential. The temperature should never be lower than ninety degrees, and may be as high as one hundred. By the natural method of raising chicks with a hen, we can have this temperature only in midsummer. In raising early chicks this difficulty has been provided for by an artificial mother called a brooder.

By using the brooder an even temperature is secured and many more chicks can be reared together than with the natural mother.

They should be fed every two hours for the first three or four weeks, but never more at a time than they can eat. Hard-boiled eggs are said to be the best food for them. Bread moistened with milk is also good,

and may be mixed with a little corn-meal; but corn-meal alone is too strong for the chicks. As they grow older they can use cracked wheat and corn, and a variety of grain and vegetables.

Little chicks and ducklings should have all the water they can drink, but it should be given in such a way that they cannot get into it. They should never get wet while they are quite young.

The main points, in raising early chicks, are to keep them warm, dry and clean, to feed and water them judiciously and give them plenty of exercise.

Later in the season we are likely to have gapes to contend with. To prevent this trouble it is recommended to sprinkle the yards with a solution of chloride of lime or copperas.

After all our faithful care of our little feathered pets, it seems a sad fate for them to go, at so tender an age, into the frying-pan.

THE ARTIFICIAL HATCHING OF POULTRY.

By S. V. BENNET, *Wellsboro', Pa.*

(Read at the Wellsboro' Meeting.)

This is truly the age of great achievements, and among the many and vast subjects which have occupied the attention of the thinking world "artificial hatching" has for the last few years received its share.

Incubation, by artificial means, is no longer a disputed point, nor would it have been, had we been more conversant with history, or at least have been willing to accept the statements of ancient writers.

The Egyptians, centuries ago, were most successful in this enterprise; instead of the small boxes of to-day, with a capacity for less than a hundred to a few thousand eggs, large rooms were used, heated and ventilated in the most scientific manner, surpassing anything we can boast of, in this, our nineteenth century.

However, as we have regained this lost art, let us proceed.

We will first discuss the incubator.

It might be well to state here, that the operator, while entirely distinct in one sense of the word becomes lost, as it were, in another; or he and his machine are, as in matrimony, two in one.

It is hard to give a good idea of the work by separating its two principal factors, the man and the incubator.

There are now so many incubator factories, each claiming their machines to be the best, one is at loss to know which to choose; there are some points to consider before making a selection.

First. My experience would not recommend a cheap machine, they are dear at any price.

Second. It is well to visit a factory, if convenient, and see the machine in operation; examine into its construction, and thoroughly understand the causes and effects which govern the working of its machinery. Take nothing for granted, let there be a reason for everything; and an incubator built upon these principles will, with proper care, give satisfaction.

Again and again we hear the questions: "Are incubators necessary to a successful poultry business?" "Do you think the chicks as strong

as those hatched under a hen?" "What incubator do you consider the best?" and, last, but not least, "Does it pay?"

To the question regarding the necessity of incubators, I would say, no poultry business of any pretension can be properly conducted without the aid of incubators. The very convenience of hatching chicks when you desire, without having to consult a fussy old hen, is enough to recommend them.

The cost and care of running a machine is much less than the cost of keeping hens for setting, to say nothing of the broken eggs, vermin, and a dozen other provoking things, which will occur among a number of setting hens.

With an incubator, the subject of success or failure lies almost entirely in your own hands; the time when the old hen can monopolize the hatching business is past.

There is no place where strict attention to business will tell more, and pay better, than here.

"Do I consider the chicks of an incubator as strong as those hatched under a setting hen?"

Most emphatically I say "yes!" all conditions being equal, *i. e.*, with fresh eggs from vigorous stock, and good care during incubation, a reliable machine will produce as strong, active chicks as any hen can boast of; lacking only the proverbial hen louse.

After carefully examining many machines, I have come to the conclusion that, so far as I am concerned, the "Perfect Hatcher" is the one for me. It is well-built, automatic and reliable: will do its work well if you do yours. Here is a point which must not be forgotten. Do not expect too much of any incubator, remember you have a duty to perform.

That artificial hatching and rearing of poultry is a paying business, there is no doubt, but bear in mind it takes money to make money, and unless one has some little capital to invest, I would not advise any one to expect to make a living by it; to say nothing of the fortunes that poultry papers often promise to those who will "get a few hens and make a start."

It is true one may begin with a small outlay and work into a good paying business, yet remember it will take time to accomplish this, and you must have some other visible means of support, till your flock has increased to sufficient size to earn you a living.

After you have gained this end, sum up what your outlay has been, and I am confident you will be surprised at the magnitude of your investment. It will not be far from two or three thousand dollars, and I am certain you would not then take that for it.

Now, after we have chosen our incubator, let us look a little to the care it will require. First of all, we must be particular in the selection of the eggs we use.

As I have mentioned before, the eggs must be fresh and from vigorous stock. By vigorous stock I mean fowl in perfect health, made so by good care and plain food. None of your artificial beauties, fed upon the so-called poultry foods and tonics, and kept in close confinement, will do. Eggs from such stock are almost worthless.

Before putting in the eggs, it is well to run your incubator a few days, in order to become thoroughly familiar with its workings. Next arrange the eggs upon the trays provided for that purpose, being sure to place each egg with the larger end up. The reason of placing eggs

in this position is very important, as the chicken then begins its growth in the large end of the shell, just where you want it.

The result at the time of hatching is anything but satisfactory where attention is not paid to this point.

Chicks allowed to grow in the small end of the shell will die for the want of room to free themselves from their narrow quarters.

All things are now ready, and the real work begins. It is not necessary in my opinion, to turn the eggs for the first twenty four hours, but after that time let them be turned every night and morning, taking care not to shake them more than is absolutely necessary.

Trim, fill and clean your lamps every morning. Fill them at night without detaching them from the machine; this latter care will ensure their burning more evenly. In placing lamps in position, be sure that the connections are properly made, that nothing binds or hinders the easy workings of the rods, etc.; a little negligence here will cause trouble.

After the eggs have been in the machine for four or five days, it is well to test them; taking out all unfertile or clear eggs, and filling the space thus left with other eggs.

To test eggs: Place an egg at the end of a tube, holding it toward the light; with one eye look through the tube, and the appearance of a fertile egg is that of a cobweb, composed of red material with a spider in the centre. This is the growing chick. A little practice will enable one to tell almost instantly the fertile from the unfertile.

Examine every morning all parts of your incubator, and see that everything is in working order. Do not forget this. Keep the pans for supplying moisture full of water at all times. Keep everything clean about the incubator room, and avoid dust. Thus you may continue, and if your work has been well done and no accidents occur, you will be rewarded very often on the nineteenth day by the shrill, tiny chirps of your brood, announcing their advent; and upon examination you will find many of the eggs "pipped," as it is termed. Do not disturb the eggs. Let nature do her part, thou hast done thine, and by the morrow you will find all sorts of youngsters, from the downy chick to the poor, wet, struggling something, half out of the shell.

It is well to put the dry chicks in a small basket by themselves, in the bottom of the incubator. Remove all shells from the machine, and avoid keeping doors open for any great length of time, as it chills the chicks. By the end of the twenty-first day the hatch should be nearly finished, so the machine may be cleaned and a new hatching begin if desired.

Do not feed chicks anything for the first twenty-four hours; more loss comes from being too kind than people are aware.

I will now leave the operator with his brood of artificially hatched motherless chicks. His real trouble has just begun; however, I wish him the best of success with his undertaking. Nothing but stern experience can teach him how to raise and care for incubator chicks.

COMFORT AND ECONOMY IN THE BARN.

By J. B. JOHNSON, *New Wilmington, Pa.*

(Read at Mercer Institute.)

Those who have been accustomed all their lives to comfortable and convenient barns, do not know how much they enjoy until they do the work for awhile in one of the ill-arranged structures that serve the place of barn on so many farms. No building on the farm should be more carefully planned for labor-saving than the barn. Yet how often the barn seems to be merely a combination of posts, boards and logs, without any plan. There is certain work in the barn that must be done three times a day, and one thousand and ninety-five times a year. This kind of work should be especially planned for.

As the most important part of a house is the kitchen and convenient arrangements for doing work there, so in the barn the most important part is the stable and convenient arrangements for supplying food, water and air, and removing manure.

The parts of my subjects are so closely allied that we cannot have one without the other. We cannot have comfort without the practice of economy, and we cannot have economy without the requisites of comfort.

One essential to comfort and economy in the barn is heat, with the arrangements for ventilation. We can keep our mature animals warm enough to live by supplying heat-producing foods, without shelter, but there is neither comfort nor economy in such a measure. A judicious use of lumber, straw and building paper is more economical and more comfort-giving than to try to keep up the animal heat with feed, when oil, meal and chop are twenty-seven dollars per ton.

Let us close up every crack and cranny about the stable, so that such winds as howled about our barns on February 3, 1891, cannot reach our stock; but let us also arrange to give them plenty of fresh air. I have gone into stables where the owner said, "his sheep were doing no good, he didn't know why," and I have found the air so unwholesome that the only wonder is the sheep were alive. Very often the only prescriptions ailing stock needs is, "open those windows, or knock off a board, and let God's free air blow out the deadly carbonic acid gas." This whole matter of ventilation in the barn must be under the owners control, and it must be controlled with judgment if you would have comfortable, healthy animals, economically stabled. I am a great advocate of fresh air, but I want to be able to control the amount of it that comes into the barn and the direction it comes from, so that when a winter calf or lamb comes it will not need to be carried to the house for heat. This subject of ventilation is a large one, and the half would not be told when many lengthy papers were written upon it.

The water supply is a source of comfort and economy or else of discomfort and expense. If the stock must go ten rods through snow and mud and stand shivering in the sleet while they drink ice water through a hole in the ice, the chances are that the owner is looking for some one to lend him some money on a second mortgage. I would advise a pump in the basement, if there is room for watering stock there, and if there is not room there, then let the water trough be in a building very convenient to the stable. A certain amount of liquid is as essential in the daily ration of man and beast as food. If the water is

not palatable, is too dirty or too cold, animals will frequently drink none one day and too much the next, to the detriment of health and condition. Water coming from an ordinary twenty-foot well is about forty-four degrees. Let it stand in an icy trough half an hour, when the mercury is at zero, and it will go down to thirty-two degrees. Let the stock drink it at thirty-two, and it chills them, and they stand in the stall for an hour trembling with the cold. When water is drank at this temperature, it must be brought up to ninety-eight degrees blood heat, by burning your corn and mine in the stomach. It will pay in dollars and cents to heat drinking water for farm stock.

Comfort and economy demand that the water supply be pure. An epidemic of typhoid fever has raged in one part of Albany, New York, this winter. The health officers investigated the matter and found that in every family where the fever raged river water had been used for household purposes—water that was contaminated by the sewage of Troy, six miles above; while families using water from other sources escaped. It is a mistake to suppose that water from a spring is always pure. Spring water, that has received the sewage of either the house or barn is sometimes very unhealthy. And wells that are very near the barn-yard sometimes become so impure from the drainage of the barn-yard, that is more like manure water than drinking water. Fill up such a well and dig a new one, further from the barn, and put the pump wherever it is most convenient, connected with the well by galvanized iron pipe buried three or four feet in the ground. Be sure the water supply is pure.

Comfort and economy require good feed, and plenty of it. It is a mistake to stint our farm animals in feed or care.

We boast that we live in this enlightened nineteenth century and use all the labor-saving appliances for the easy and rapid accomplishment of our farm work. Very true. But too seldom do we mix brains with our work. We go with a friend to his barn to get hay for my horse. He throws it from a high mow, carries it the length of the barn floor and across the floor, throws it down the stairs and climbs down on it, carries it the length of the entry and through the colt stable to my horse, almost exactly under where he got the hay. All this work must be done for his own horses three times a day for six months or more each year. A chute in the corner of the mow would deliver the hay almost exactly in the horses manger. Another friend who wants ten ears of corn for my horse must go three rods through the mud or snow to the crib, making a six-rod trip every feeding time. No entry is complete without an ample corn bin to be filled from the barn floor, an oats bin with conductor from the garner and a hay chute from the mow above. I speak thus particularly about economizing the work of feeding horses, for on almost every farm this is work that must be done three times a day in the heat and hurry and weariness of summer, as well as in the cold of winter.

Economy and comfort of both owner and stock demand a covered barn-yard. I do not say that the whole yard should be covered, but enough of it should be covered to have a large straw stack under cover. We depend upon straw as one of our principal absorbents. What is it worth as an absorbent when it is thrown to the stock soaked and frozen. The value of barn-yard manure which we so often see spoken of, is estimated on the commercial value of a ton of manure, not a ton of straw and rain-water. We must not imagine we are putting four dollars worth of plant food on our ground every time we haul a load

of wet straw from the manure heap. To make good manure and comfortable bedding for the stock, the straw must be kept dry until it is placed under the stock. And the manure must be kept from burning and from the rain until it is placed on the field. It is not always convenient to haul and spread manure as it is made; then it should be kept in a manure shed—part of the straw shed if you wish—and it need not be a foul-smelling place as the manure heap too often is.

I will not say that comfort and economy require a silo, for I know nothing of the silo by experience. The silo has its friends and its enemies, but I believe that ensilage is the coming feed.

But I know that comfort and economy demand good paths from barn to house, convenient arrangement of stables, outside buildings, gates, paths and roads, the use of well-made and well-hung doors throughout the basement and super-structure, and demand also that the owner be a man or woman with a head above his shoulders and something in his head.

In all the list of trades and professions there is probably none that requires as extensive and varied knowledge, and the exercise of so much judgment or good, solid, common sense, as the profession of farming. Let us magnify our calling and never say as a candidate once said to me, "I am only a farmer, but I would like to have you vote for me, and use your influence for me." My thought was, if you are one of the men who call yourself "only a farmer," I shall "use my influence" to have you remain only a farmer. Let us be men, and plan our farm work and farm buildings for the comfort of ourselves and our stock, and for the economy of time, labor, feed and money, for "economy is wealth."

PURCHASE AND CARE OF FARM IMPLEMENTS.

By J. C. BELL, *West Middlesex, Pa.*

(Read at Mercer Institute.)

That which I have to say on this subject will have reference more particularly to the complicated and expensive class of machinery than to the plainer and cheaper class.

The subject is naturally divided into two parts: first the purchase, and second the care, of implements and machinery.

On the subject of purchase, I will first endeavor to show the necessity of reason and intelligence, to determine whether it would be prudent to purchase or not; and second to throw out some hints that might aid you in selecting the machinery that would be likely to give you satisfaction.

It is no uncommon thing to meet with men who have become, to some extent at least, financially embarrassed through the purchase of machinery that might have been dispensed with until they were better able to pay for it.

This, though, is not so much due to the purchase of that which was really needed, or that which could be used to the best advantage, as to the purchase of new inventions at high prices, and before such implements were brought up to the proper stage of perfection, and which soon gave out at some vital point and became useless.

Not many men who buy only first-class machinery that has been fully tested, and buy only that which is actually needed, are any worse off because of such purchase, even though they may have paid the highest market price.

The great improvements that have been made in agricultural implements in the last forty years have progressed much faster than the education of farmers in the art of purchasing, using and taking care of them.

It requires more intelligence in 1891 to purchase a mower, reaper or binder than it did in 1850 to buy a sickle, scythe or grain cradle.

It requires more brains to keep in order and run the improved implements than it did forty years ago to hang a mowing scythe or grain cradle. Hence, more mechanical education and skill is necessary to purchase and handle intelligently the implements of the present day.

A really valuable, well-made machine, which is a time and labor saver, is practically indispensable to the enterprising farmer of modern times. Therefore, in the purchase of these well nigh indispensable implements, great caution and good common sense should be used.

The intelligent farmer, before purchasing any of the more expensive class of machinery, will first make a calculation of their cost, and compare it with the benefits and profits likely to be derived from their use.

Suppose you contemplate buying a binder. The first thing you should do would be to make a calculation of what it will have cost you by the time it is worn out. Then, over against that, make a calculation of how much time and money it will save you; the increased acreage you may be able to harvest; how much you may save in securing your crops in proper season, and how much bone labor you may save. Some of us make the latter one of the biggest items. We cannot think of doing our work by "main strength and awkwardness," as our forefathers did. Continuing the illustration, we will suppose you are an average farmer with one hundred acres of land, on which you raise twelve acres of wheat and eighteen acres of oats as your average annual crop, making thirty acres in all that you will want to cut with the contemplated binder.

Suppose the binder to cost you one hundred and thirty dollars and to last you twenty years. The interest on one hundred and thirty dollars for twenty years, at compound interest, is two hundred and eighty-six dollars, which, being added to the principal, will make four hundred and sixteen dollars, to which should be added for storage, fifteen dollars; probable repairs, fifteen dollars; and for insurance, four dollars; making in all four hundred and fifty dollars the total cost of your binder.

As this looks like such a large sum, you will naturally (and properly too) begin to figure on what it will cost you to hire the work done. Suppose you can hire your neighbor with his binder to cut your thirty acres at fifty cents an acre, you to find the team and twine (this was the price paid last season in our locality). To get at the real hire of the binder, you might deduct something for your neighbor's time, perhaps thirteen cents an acre would be enough for that, which would leave thirty-seven cents an acre as the real hire of the binder. Your thirty acres, at thirty-seven cents, would cost eleven dollars and ten cents annually, say eleven dollars in round numbers. The eleven dollars you pay annually, at compound interest, computed from the time it would be paid until the end of the twenty years, would amount to about four hundred and twenty-five dollars, or twenty-five less than the cost

of the binder. But these are not all the items that should enter into the calculation. You should consider the annoyance of hunting up a binder to hire, also the possibility of not getting your grain cut when it is ready, the probability of making something cutting grain for your neighbor if you owned a machine yourself, and the probability of saving something by running the binder yourself instead of paying your neighbor for his time. By considering all these uncertain quantities you would likely decide in favor of buying.

I do not use this illustration for the purpose of prejudicing anyone either for or against the purchase of a binder, but merely to suggest a formula, by which you should make a mathematical calculation before you purchase any kind of machinery.

When you have decided to purchase any kind of implement or machine, you will often be perplexed to know which make is best, or which to select.

When we try to suggest any rules to guide you in making a decision, we have a big contract on hand, because any rules we might suggest will admit of so many exceptions.

As a general rule, do not buy an implement because you can get it for the least money, because its cheapness is *prima facie* evidence of its inferiority.

Neither purchase the highest priced implement simply because it is the highest priced, but satisfy yourself whether the superior merits claimed for it will justify the higher price asked for it.

Do not buy a machine simply because your neighbor, who knows but little about any other kind than his own, recommends you to get one like his, because he may have the most worthless machine on the market and not know it.

I can give you the name of a farmer in this county who bought an implement after he had tried it and paid full retail price for it, who had been offered one of another make, and which he had also tried, for less than two-thirds of the price he paid for the one he bought. And yet many farmers who own the kind he rejected, declare it to be as good if not the best kind manufactured.

Do not buy a machine that has just come on the market, because in nine out of ten cases it will be far from being perfect. Don't experiment for the benefit of manufacturers unless you are a millionaire. Remember that experience costs money. An old German once said, "Exberience vas a goot teacher, but de great drouble mit him vas he goom too late." That is the way with us farmers; the lessons we learn by experience come too late. If our foresight was as clear as our hindsight, it would save us many a dollar. Neither would it be good policy to discard new machinery altogether, because there are always improvements being made; but it would be as well to let the other fellow do the experimenting.

Don't have a field contest to decide the merits of competing machines, because when shown up by their representatives they are all likely to do good work, and besides such a contest is no test of durability.

Unless you are a mechanical expert you could not tell which was the best machine, and would probably buy the one you could get for the least money, which would likely be a serious mistake. Manufacturers of first class and durable machinery cannot afford to cut prices low enough to compete with lower grades.

In buying your implements and machinery, the best way is to purchase through the regular channels of trade. It is better to pay a regular dealer a fair profit and get a good implement, than to buy from strange manufacturers and run the risk of getting a poor article at the wholesale price.

The goods of the better class of manufacturers are sold through dealers, and you could not likely get a first-class implement anywhere at wholesale rates.

A farmer in the western part of the county, who wanted a certain implement, and wanted to save a dealer's profit, wrote to a firm who advertised liberally. The result was, he got the implement at the wholesale price, but he was so disgusted with it that he would have been willing to pay full retail price for a similar one that had been offered him before he began his correspondence.

Many manufacturers of unsalable goods get them sold in this way by extensive advertising.

We know of no better way of deciding which is the best implements to purchase than by educating yourself by general observation and by investigating the merits of the different kind of machines that come under your notice. Look at closely and investigate every machine you see. Attend the fairs; go early in the morning; scrutinize carefully every implement on the ground; ask questions of dealers, they take pleasure in explaining and showing their goods. Don't forget to take your wife with you, she will want to look at the sewing machines, washing machines, wringers, churns, etc. Get the opinions of intelligent farmers who have had experience with different implements, and those who have some mechanical genius. If you do this you will keep yourself posted in the improvements and superior points of the various implements; and when you are ready to purchase, the knowledge thus gained will be of much advantage in making a selection.

When you want to purchase and have failed to use your opportunity of investigation, or, if you are in doubt as to the make of machine to select, the safest rule to follow is to purchase from a dealer that has a reputation for fair dealing—one who values his reputation more than money, one whose word is as good as his bond. Such men will not knowingly palm off on their patrons implements that won't give satisfaction.

It would be well to remember that dishonest dealers prefer to handle goods that will afford them the most profit, which is usually an inferior grade that they try to sell as high as better grades.

When you have decided on the machine you will purchase, make the very best bargain you can with the dealer. Get it on trial if you can, unless you are fully satisfied that it will do the work. Get as strong and as long a warranty on it as you can get. Whatever the contract may be let there be a memorandum made and signed by both parties, because one party or the other may forget. Pay cash down at time of sale or after trial, and insist on a reasonable reduction for cash. Nothing will reduce a dealer to his lowest terms quicker than cash or prompt pay. If you haven't got the money borrow it. Better do that than have your note turn up at some bank at a time when you are not ready to meet it. You would be more likely to get an extension of time from the man you borrow from near home, than from a foreign manufacturer. If your dealer makes you a reduction for cash or for any other reason, you should have sense enough not to tell it, because you might want

favors from dealers some time again. Show your appreciation of his favor by keeping it to yourself.

On the second part of my subject, which is "caring for farm implements," I will remark that most farmers think they know all about it. They think if they keep them in the dry, and well painted, that they have fulfilled the moral law in all its precepts concerning the care of their implements.

While this is important to its durability, the careful usage, oiling and keeping in good running order is another point we think is equally, if not more important. This is more particularly true of machinery with quick motion, such as mowers, binders, thrashers, engines, etc. Most farmers know more about the importance of keeping their implements sheltered and painted than they practice. How often we see a man unhitch from his farm wagon at his coal house, or possibly at the door of the wagon shed and let it stand a week or more exposed to the weather, when a half minute's work would have run it under shelter. Or how often we see him in the evening unhitch from his sulky cultivator in the field, when he could just as easily have driven it to the barn and sheltered it over night or from a week of unexpected bad weather. Have you not seen him do the same with other costly machinery. It is not for lack of knowledge, but it is simply inexcusable negligence, that these careless tricks are done. If we could cure him of his negligence rather than increase his knowledge we would be doing him a great kindness.

If you were to ask me for a prescription that would cure negligence, I would write just two words: think, act. Negligent farmers are you willing to try the medicine prescribed? You may gag a little at first, but you will soon become used to it. As the prescription is free, and the medicine cheap, it should be applied freely, externally, internally and eternally, until a cure is effected.

I believe that many kinds of implements such as farm wagons, sleds, harrows, cultivators, horse-rakes and implements of that class, will not last one-fourth as long if carelessly left out to rust and decay from one season to another, as they would if kept painted and sheltered when not in use.

The farmer that is too poor to provide a covering for his implements is too poor to own them, and, unless he is lucky, he will soon be too poor to own his farm. Bear in mind that paint, boards and roofing material will save you at least three hundred per cent. of their cost in saving your implements.

The next thing is oil. Use good oil and plenty of it. The best castor oil for spindles, and No. 1 lard oil for machinery. Many farmers do not know how to use oil on their vehicles; they don't seem to know that the spindles of their vehicles would wear as long again if the work of oiling was properly done. Every time you oil spindles, clean them off thoroughly; the theory is that the particles of iron which are worn off are mixed with the oil, and while it may not be as injurious as sand, it has a tendency to wear the spindle and boxes very fast. Rags are cheap; keep them handy for wiping spindles. It would be impracticable to open up and clean the boxes and journals of mowers, etc., yet the accumulation of this injurious substance may be avoided by a free use of oil. When you have machinery with oil cups put a little tuft of wool in each cup, which will hold the oil and let it down by degrees. When you are oiling your machine don't forget that a few extra gallons of oil won't cost you as much as a new machine.

There are some other points in the care of a machine that to my mind is almost, if not altogether, as important to its durability as shelter or paint; that is careful handling and keeping it in good running order.

Many of us could make our machines last nearly twice as long by keeping everything in good order, by tightening up and getting a few repairs at the proper time.

Some men will run a machine as long as a wheel will turn without paying any attention to it; and when it wont run any longer they look it over and find bolts lost, boxes shaking loose, shafts out of line, and probably something broken that might have been avoided if a wrench had been used to tighten up bolts, or a screw or rivet put in at the proper time.

To keep a machine in good running order it is necessary that the operator knows the use of every cog wheel, journal, ratchet or spring. The man that don't understand his machine is no more competent to run and take care of it than a physician is competent to diagnose and treat your disease who does not understand the anatomy of the human body.

If the knotter of the binder fails to tie properly, you should so understand its construction that you could adjust it. When you purchase a machine have the dealer explain the working of every part, then study it yourself.

The pitman connections of mowers and binders should receive the most careful attention. If these get worn and loose, the jarring at every turn of the crank-shaft will soon play havoc with other parts of the machinery. Some kinds of machines are so constructed that wooden boxing may be used on the pitman at the crank-pin. Any hard, close-grained wood such as sugar or cherry, neatly fitted to the crank-pin, will wear almost as long as the common brass or composition box.

Many a farmer lets his machine go to rack for want of tools to keep it in order. When he is in a hurry he will run it when he knows it is out of order, rather than take time to get it repaired; when, if he had tools, he could put in order it in a few minutes himself.

I cannot begin to enumerate the advantages a farmer would realize by having a supply of tools suitable for his work. Possibly some of you have had to stop mowing in the middle of the forenoon and go to the blacksmith shop, losing half a day or more on a good hay-day, to get a guard or section put on your machine; when, if you had had a punch, cold-chisel, hammer, and some rivets in the tool-box, you could have done the work in fifteen minutes without leaving the field.

From twenty to twenty-five dollars will get you a portable forge, drill-press, screw-plate and taps, anvil and vise, tongs, hammers, files, etc. A similar amount will get you a good lot of tools for working in wood. You will need a hand-saw, square, brace, a supply of bits ranging in size from a small gimlet to an inch, then an inch and a quarter, an inch and a half and a two-inch auger, wood-rasp, drawing-knife, spoke-shave, a few chisels and two or three planes. With these you can put yourself up a work-bench which should have a wood vise, a shaving-horse and, if necessary, a building in which to keep them. You would be surprised to find how much time in running to the shop or going to your neighbor to borrow tools it would save you.

A few days ago I read of a farmer who owned over one hundred acres of land, and who walked to a neighbors that lived over a mile away to borrow a small bit that cost but twenty-five cents. The neighbor was

a mile from home, and he had to travel another mile to see him to find out where he kept the bit, then another mile back to the house to get it, another mile to his home, then two more miles in returning it, making in all over six miles of travel or nearly as far as he would be required to plow an acre of ground.

Many farmers spend more time borrowing little articles like that than would buy them; and some think, too, that it is trouble enough to do the borrowing without taking home the borrowed article.

If any of you farmers here have no tools for the repair of harness, and are lucky enough to have a dollar in your pocket, before you go home spend it for some harness needles, a ball of thread and some wax, an awl or two, a box of five-eighth copper rivets, a leather punch; and the first wet day that comes go over your harness, fix up the places that are ripped or broken, and when anything in future breaks, fix it; and you will save enough the first year to pay you five hundred per cent. on the investment.

The other tools I have mentioned will pay you twenty-five per cent. per annum in time, dollars and cents saved in the caring for and repairing of your wagons, plows, harrows, single trees, double trees, rakes, pumps, and machines generally.

With a little practice you will soon learn to handle tools with some degree of skill, and besides the boys will learn to use them, and when they become men their education in this line will be of immense value.

We make a great fuss and ado about corporations and manufacturers becoming wealthy at the expense of the farmer; that we are down-trodden and oppressed with taxation and high prices for that which we need and consume.

While we are justly crying out for equalization of taxation, and while we shout for a "protective tariff" or a "tariff for revenue only", as the case may be, let us begin a reform at home. Let us protect the labor of hands by diligence, carefulness and thoughtfulness. By our own stupidity and negligence in the selection, purchasing, caring for, and handling our farm implements, we contribute annually tens of thousands of dollars to the pockets of inventors, manufacturers and dealers in our farm implements.

CARP CULTURE.

By HENRY PENCE, *Kellersburg, Pa.*

(Read at Kittanning Institute.)

The carp is a native of the central countries of Europe, and corresponding latitudes in Asia. But on account of its value as an article of food, it has been long naturalized in many countries in which it is not a native.

No fish except the gold fish, has been so much transported by man from one place to another. And this has been the more easily and successfully accomplished, because the carp can live longer than most fish out of the water if only kept moist.

In northern countries, it neither increases so rapidly in size, nor exhibits so great fecundity as in more congenial climates. Its fecun-

dity in favorable circumstances is prodigious, more than seven hundred thousand eggs have been found in the ovaries of a single carp of moderate size. The carp is rather an inhabitant of lakes and ponds, than of rivers, in which, if it is found, it shows a preference for the stillest parts.

It feeds chiefly on aquatic plants, and can be fattened on grain and vegetables. It naturally deposits its spawn on weeds and the depth of the water should be six inches. It is said to live to a great age, even one hundred and fifty or two hundred years, its scales becoming gray and white with age.

Thirty or forty pounds is not an unusual size in some of the German lakes. In Austria and Prussia many lakes and ponds are let at a high rent for the carp which they contain.

In the ponds the carp is a free biter, when hooked he runs strongly and fights with considerable determination and cunning. It is advisable however that the line be so placed that the bait may be just off the bottom of the pond. The best bait is bread worked into a paste. When a carp bites he nibbles at the bait for some seconds before he takes it but it is useless to strike until he strikes.

Carp as a food fish is of a good grade, is free of the bunch bones that are found in many fish of a lower order, and when properly prepared have a pleasant taste to all lovers of good fresh fish.

Carp culture is almost in its infancy yet in the United States of America, being not more than a quarter of a century since they were first transported to this country. If they have been grown successfully in Europe, why can't we do the same here in this country?

There are very few farms in Armstrong county, which have not a good situation for one, two or three carp ponds. The swamps and gulleys can be turned into more profit than the most fertile part of the farm by stocking them with carp.

There should be at least two or three ponds on every farm, a spawning pond, a pond for the fry (the small fish), and a pond for the marketable fish.

The spawning pond should be shallow water, the pond for the small fish of medium depth from three to four feet, and the pond for the large fish from four to six feet. The fry must be taken out of the spawning pond each year, before spawning time (which is about the last of May or first of June).

Carp ponds are best constructed of earth, clay being the best material. Ponds should have a slope on each side of forty-five degrees, sown with grass, well cared for, and with some trained spruce around, can be made quite ornamental. The ponds should be fed by never-failing springs, or the water can be taken through pipes from running streams.

The ponds can be drained through pipes, trunks, or through siphons; they should be so constructed that no rain or snow water can run into them. A pond can be made to answer for several purposes in addition to growing fish. The farmer needs a pond to gather his crop of ice for summer use, and in winter time a fish pond makes a good skating rink for the boys and girls.

IDEAL STANDARDS IN FARMING.

By GEORGE E. HULL, Orangeville, Pa.

(Read at Mercer Institute.)

A successful and wealthy manufacturer of railroad iron, when asked the secret of his success, answered, that *his* success lay in his *persist-ent* endeavor to make each succeeding batch of iron *better*, if possible, than the last ones made. And that *all* should approach as near as possible to an ideal standard, or model of merit, as a manufacturer could produce.

The celebrated Madole hammer, and Henry Disston saws, which every carpenter recognizes among the very best tools of their kind, the mowers, the reapers and the binders, which have successively come to the front and to the aid of the farmer, and every other article which is to-day manufactured, which has a recognized merit, and standard value, won its reputation through the determination of the manufacturer to produce and put upon the market a first-class article. This principle of honorable success, so applicable to the manufacturer, who successfully manufactures his goods after an ideal standard, is *no less* applicable to the breeder, the stockman or the general farmer. The farmer, like the manufacturer, who is ambitious to be successful in his calling, should ever be guided by an ideal standard, or model of merit, which should lead him onward and upward, not morally and socially, but also as to his farm, its managements, its equipments and conveniences, the selecting, the breeding, and marketing of his stock. In full heart and sympathy with this spirit of progress, and always profiting by his own experience, and also by the experience of, and information given by, others in social intercourse and through the press, with that foresight and discerning judgment which becomes the progressive farmer, he should endeavor to make every step taken one of progress; and this must necessarily be to insure future prosperity to the farmer in this country.

The brood mare, the brood sow, the bunch of breeding ewes, every bunch of sheep selected and fed for the shambles, every bunch of lambs bred, should be the most even in size, the finest and best in quality, and in every way the most desirable, and salable, of any stock preceding them. Finally the standard of their excellence should be their advertisement and their market. The credit or debtor balance at the year's end on the pages of the ledger devoted to the farm stock, depends not only on the management and the feeding of the stock, but also, on its yearly weeding and selection. And upon the quality, of the standard chosen as a model or guide in the management, settles the problem as to profit or loss in labor and investment.

It is a maxim, "That the sheep possesses for the farmer a golden hoof," and while this should be true, comparatively speaking, the saying is just as likely to be erroneous, as the remark we have often heard made "that sheep were profitable as grubbers." "Do men gather grapes of thorns, or figs of thistles?" There can be but one answer to this question, and that in the negative. And I do not know of a single instance in my recollection where any man ever gathered successfully wool and mutton from hazel, burdock, or thistles. We often see the plan tried but the scheme is never successful.

The start in a race frequently determines the result. The preparation of a seed bed often determines the result of a crop. Hence also in the beginning or start in a farm enterprise, upon the standard chosen, by which we select, or breed our farm stock, with clear and well-defined ideas as to what purpose we select for, or breed for, determines whether or not the enterprise is to be crowned with success, and the hoofs of our farm stock prove to be golden.

The farmer whose ambition is guided by cool and judicious judgment in the management of a mixed husbandry is probably as likely to succeed at present under the influence of prevailing circumstances to send his grain fed to stock and the stock itself from the farm on golden hoofs as any other class of farmers. And yet we can confound this principle of a mixed husbandry with a principle which often breeds disaster, as in carrying some of all kinds of stock we are liable to overcrowd our feeding capacity in winter, and our pastures in summer. The sales are not so sweeping at any one time, lessening the amount of stock at a single sale, to the capacity of the amount of feed on hand to carry the stock through a protracted drouth or long winter. Every careful and foresighted farmer who foresees the unwelcome expense of having to buy feed in seasons of scarcity, to carry his stock through a protracted drouth or long winter, will avert the danger by adjusting the amount of his stock to the corresponding capacity of his feed. It is an old adage and a true one, that, "a danger foreseen is half averted." And the farmer who realizes this standard fact that we are at all times subject to late spring frosts, drouths in summer, long winters, and frequent shortages in some of our various kinds of feed crops, and at all times is prepared for the emerging by a resource supply of feed, is not the man who is ambitious to sell his farm in this community of home markets and go west. As we think over the list of names of farmers of our acquaintances in almost any neighborhood, we observe this fact. That, with possibly the dairymen excepted who has all necessary help within his own family, the farmers have been the most prosperous and progressive, who have carried out a plan of mixed farming or mixed husbandry. Farmers who have not gone wholly into sheep raising every time sheep were high in price, or principally into horses when they were the most wanted, or into something else at the time of its boom; but, on the contrary, have gone on in the even tenor of their way, keeping some of most *all* kinds of stock, whose ideal standard is ever a *good* and *marketable quality*, instead of quantity, and whose ideal life as a farmer is independence and contentment, for contentment if under comfortable circumstances in the middle walks of life is independence. And it is an old proverb always truthfully told that the greatest wealth that a man can possess is *contentment*.

There never was a successful manufacturer of any kind of a commodity, or any man who had under his care, and control, a complication of affairs, who had foresight and discernment enough to direct, govern, and successfully manage his own business, but what was necessarily an independent thinker. This is equally true concerning the farmer. A man may follow some antiquated system of management as he has always done, and also his ancestors before him, or he may sell goods for such a percentage of gain, and mechanically complete the circle of an annual business by rule. But the man who stands *master* of the situation in his business in *any calling* in life must realize that we have entered an age of improvement, and under the almost startling changes from the old modes to the new ways, which

are to-day successfully engaging our attention, he must think and act for himself or get left in the race. And any move that he may make in any way in the management of his affairs, should be made so far as possible with a knowledge of what others are doing in the same line of business as his own, but with a considerate independence of the cause that they are pursuing in that line of business. If the majority of the merchants through the county that are engaged in the dry goods trade, should change and go into the hardware or into some other speciality because the merchants in that line of trade had done the best during the last year, *that business* would then be overdone, and many of them would see hard times and even fail.

Should the majority of the men in the professional callings through the country adopt one, there would not be room enough in Webster's proverbial, "up-stairs" and the majority would fail, while those who remained true and unwavering in their special branches previously chosen would do well.

And yet we as farmers in this country too frequently make just this kind of a mistake. Too many of us do not do enough independent thinking and acting. Like drowning seamen we are too apt to grasp some project of bright promises that unexpectedly looms up, and swamp it to the inconvenience and peril to the majority. The man who is continually changing the standard of his farm operations, shifting from one speciality to another, in constant pursuit of that line of farming which is paying the best at the time of the change, usually hoes a hard row. Said a man to me a few years ago, I do not know why it *is* so, but it is just this way with *me*, when I get anything to put on to my farm, let it be stock, or seed, I have to pay an exorbitant price for it, and when I get any farm stock, or produce ready to *sell*, it seems that all creation has the same article on sale. The price is then always low and I do not get much for it. If I could sell my farm I believe that I would go west.

The simple story of this man's experience, so honestly and discouragingly told to me is not an uncommon one, and is easily explained. He was always ready for the commencement of a new race, for which he paid large entrance fees, and in which he was *just as sure* to get left. Always paying inflated prices, for the article the most in demand at the time of its purchase.

To illustrate, when butter was bringing a good price, this man was always looking around for another cow or two. Because, as he said, butter paid now better than anything else on a farm. When the usual periodical high prices in sheep came around, he found himself out of *that* kind of stock, since he had sold the last ones that he had at a sacrifice to get rid of them. But as he always went into the business of sheep raising under just these circumstances he never failed to buy. But when he again got his stock bred, grown and ready for market he found that thousands of other farmers had done precisely the same thing. The markets were now glutted with the article that he had now on sale and our friend would again be obliged to sell his surplus stock at a sacrifice to relieve his pastures or get through the winter. When potatoes were scarce and high in price, he bought seed and planted more than his usual acreage to potatoes, and was usually disappointed at the price he was obliged to accept for his crop after digging, storing and hauling to market. He would sell his team in seed time or in harvest. Lose valuable time in looking for another, and finally pay as much or more money for another team than he sold for. Thus

vacillating and ever changing, his progress was always slow, always cramped and discouraging. His row a hard one. This man and his family were known in the neighborhood where they lived to be hard workers from morning until night the year around.

This man and his family were seemingly busy at something. His crops were usually good as they were well cared for. But the financial part of his management always seemed to be a succession of failures. By way of comparison let us make use of a brighter illustration, as a proof that farming as an enterprise need not necessarily prove to be unremunerative and disastrous as to both pleasure and profit on an eastern farm. A neighbor of the farmer on a farm no larger or no better, with family expenses no less, with no better start in life, and yet a farmer who has always seemed to hold time by the forelock. *Never being driven* to a financial move but successful as a practical business farmer. Whose products usually brought remunerative prices, and whose farm stock seemed to all go off on golden hoofs. The key to this man's success lay simply in this fact. He adhered strictly to a principle of a mixed husbandry. *Never being enticed* to deviate from or change his well chosen standards as to kinds, quality or capacity, no matter how strongly the attention of other farmers might be turned towards something else, which seemed to be paying best at the time. He could always be found in possession of one or two good brood mares, a brood sow, a few good stock and butter cows, and a few well-selected breeding ewes.

Every year he turned off one or two good horses of his own raising, at prices which made his neighbor nervous to hear about. He usually sold his calves thrifty and shapely in the fall. And it was always a matter of encouragement to disparaging ones to hear this man tell what he had made from his cows that year. His stock ewes were always of the very best of the larger grades, irrespective of any particular fine breed, except in the case of the sire which he continually weeded from year to year. Throwing out the weak, old, or defective ones, and drawing his recruits from his ewe lambs which he rarely sold. He invariably had a few premium buck lambs which brought good prices among his neighbor farmers in the fall for stock, and raised the average of all the lambs sold. Which, added to the amount of money the wool sold for, from the ewes, netted him an income from his flock, the exact amount of which never indicated hard times. Having to buy nothing on the top of an inflated market, but often being enabled to sell some of his various kinds of stock on such a market, it always seemed that he had some kind of stock or farm products, that every body wanted, and by keeping within the capacity of his farm, and by being subject to disappointing failures in scarcely anything, he was in the majority of cases, enabled to feed his hay, forage, and grain, to his farm stock at a profit, and finally turn everything off on *golden hoofs*. Two examples which we commonly portrayed in the different phases of farm management and farm life.

Finally, farmers, upon the standard which measures our aspirations in the different branches of farming, largely depends our success or failure in the special branches chosen and *to which* we must now be fully awake, and upon the standard chosen as a model for our guidance, depends the success or failure and worldly rating of all men in any occupation in life. Let us then as a means of information, and making our farm life lighter, our rewards greater, and our lives brighter, take advantage of every opportunity that presents itself to

raise the standard of our ideas, as to our homes, our farms, our conveniences and privileges, the quality of our selections and products, and through the influence of standard books and periodicals, which should adorn our tables, and through social intercourse with one another, as on occasions like the present, circulate an exchange of opinions, that will tend to lengthen, deepen, and broaden, everything connected with farm life. Born of those privileges which is said to make it honorable, independent and desirable.

SCIENTIFIC FERTILIZATION.

By A. J. BREINIG, Allentown, Pa.

(Read at Macungie Institute.)

In discussing fertilizers with reference to their scientific use, I do not expect to present anything new to the intelligent reading farmer, and we may congratulate ourselves on the fact that we are living in an age when, through books and papers, the developments of science are so largely disseminated. I shall feel proud of my audience if all can say, "we have known and practiced all that you have said." Should any be present who have not made the science of using manures a study, I trust that they will recognize a something in the matter presented, that will stimulate them to lay hold of and apply in farming the results of the studies and experiments of others.

Many products are made to-day successfully, in the discovery of which the manufacturer had no part. Common sense availed itself of the scientific investigation of others, and by a judicious application of manufacturing and business tact, the result is success in product and success in business enterprise. It may be precisely so with the farmer. He need not be, and scarcely can be, expected to be a chemist, a botanist, a mineralogist, but if he is up to the times and acquaints himself with the scientific facts developed by experts, he can practically and successfully avail himself on the farm of the discoveries in the laboratory. There has been a well-known prejudice among men practical with their hands, against the equally practical work of students but who do their work with their heads. We hope this prejudice has been and is being largely overcome as the great triumphs of science manifest themselves. A mechanic who has never worked a day in the field, may so apply his mechanical art that he may invent a reaper that will save the farmers of the land many days of hard toil and many thousands of dollars. Just so the agricultural chemist, surrounded with his chemicals and retorts, guided by laws of cause and effect, not only may but already has made the discoveries, by which the farmer can make his poor land good and his good land better.

In no department of knowledge has such extraordinary progress been made within the present generation as in the development of the laws of nature which govern the growth of seeds and plants. The simple truth that plants, like animals, have their peculiar food in the soil, unlocks the whole mystery of agriculture. Modern chemistry, although it may not have discovered this truth, has illustrated and established it, and given it a force and application of which our fathers had no

conception. Every intelligent farmer now knows that he must feed his wheat, his corn, his barley, his oats, his potatoes and turnips, with the same care that he would feed his cattle, his horses and his sheep. Yes, and the agricultural chemist tells him with what he must feed them. By the analysis of the component parts of plants, it is ascertained of what elements they are constituted, and then the application of these elements to their subsistence becomes as easy and familiar as the application of food for cattle.

However much the chemist has told of the effects of the light and heat of the sun, and the constituents of the atmosphere and rain, yet with these the farmer has nothing to do except so far as proper cultivation will enable these elements to work to best advantage. The farmer can not make the light and heat, but he can so regulate the location of the crop that these may have their proper effect. He can not make the rain but he can so cultivate the ground that it may more readily retain the water that is necessary; so drain as not to be injured by excess of water; so pulverize the soil that the rain will be more available to the roots of the plants. Chemistry tells us that about two-thirds of the nutriment of plants is derived from the elements. Granting this to be correct, then the farmer can control but one-third of plant food. The proper understanding and application of this one-third of plant nutriment will constitute what may be called "scientific fertilization."

If the farmer will understand and apply the four laws of husbandry as established by Professor Liebig, he will have in a "nut shell" the entire science. These laws are as follows:

1. "A soil can be termed fertile only when it contains all the materials requisite for the nutrition of plants in the required quantity and in the proper form."

"2. With every crop a portion of these ingredients is removed. A part of this portion is again added from the inexhaustible stores of the atmosphere; another part, however, is lost forever if not replaced by man."

3. "The fertility of the soil remains unchanged if all the ingredients of a crop are given back to the land. Such a restitution is effected by manure." (The word manure must not be confounded with stable manure, but it applies to anything and everything that contains, in an available form, the required plant food.)

4. "The manure produced in the course of husbandry is not sufficient to permanently maintain the fertility of the farm; it lacks the constituency which are annually exported in the shape of grain, hay, milk and live stock."

Inasmuch as no soil in our long-established farming districts is truly fertile, that is, contains "all the materials requisite for the nutrition of plants," the above laws resolve themselves into the following: The farmer must apply all the materials, both as to quantity and quality, that a particular crop requires, in order to insure a perfect growth; except so much as the soil is known already to contain. To apply these materials he must necessarily know what are the constituents of the plants. The knowing and the application constitutes "scientific fertilization."

As a matter in point right here, allow me to quote from "A Treatise on Manures": "One of the most serious points at issue between science and agricultural practice at present, appears to be the comparative values of farm-yard manure and artificial fertilizers. So far as absolute experiment goes, the evidence seems to be in favor of the application

of the latter, while on the other hand, the preponderating opinion among farmers is on the side of farm-yard manure. Does this not show a want of judgment on the part of the farmer for applying artificial manures? His failures are due to the ignorance of the exact nature and requirements of the soil and crops he may desire to grow, or to the prejudice against artificial manures. It appears that the innovations of new systems cause deep regret in the minds of some men who are wedded to their prejudices, but those who attempt to relapse into old by-gone paths will find themselves left out in the race. It may be said that the farmer has dispensed with science in the past. Very true, science was dispensed with in times past, because, while the area of the country was as now, the population was vastly less, and their requirements far more limited. The virgin soil contained naturally a sufficiency of plant food, and by the cultivation of alternate plots the standard of fertility was kept up by nature. But now that the land has become, and is daily becoming, more incapable of producing remunerative crops without artificial assistance, it is necessary that the farmer should have a thorough knowledge of nature's laws, as regards both the soil and plant life, before he can successfully manipulate these primary agents to his own advantage. He must know the requirements of crop and soil; for "life" according to Mr. Herbert Spencer, is the "continuous adjustment of internal relations to external relations." In "the plant lies the principle of life; in the environments are these conditions of life. Without the fulfilment of the conditions, which are wholly supplied by environment, there can be no life." Therefore the farmer, to understand his part of the business, must know what to apply, and how and when to apply it most economically and efficiently.

Let us now, as briefly as possible, be guided by the agricultural chemist in his experiments and the results which they have given him, in our efforts to acquire a knowledge of the fertilizers, which can and must be furnished in successful farming. If we desire to know the constituency of any compound, natural or manufactured, we go to the analytical chemist who reduces the article into its elementary compounds, ascertaining not only the elements contained therein, but the proportion of each. Having these we can, as a rule, reproduce these compounds. It is precisely on this principle that we must proceed with reference to the requirements of any plant or crop. We question the agricultural chemist who, by analyzation, refers us to the elements he finds in that plant or crop and the quantity of each. In his investigation the chemist ascertains that the constituents of all plants are of two general characters, atmospherical matter, so designated because derived from the atmosphere, and earthy matter, because derived from the soil.

As already intimated, the farmer cannot supply the atmospherical matter, and we will content ourselves by simply stating that they consist of carbon, oxygen and hydrogen.

Nitrogen should properly be classified with the atmospheric matter. Although it forms about four-fifths of the air about us, yet plants do not get this nutriment directly from the atmosphere. Nitrogen is obtained by plants from some of its compounds, and as these compounds can be procured by the farmer, it becomes one of the principal ingredients coming under his consideration in scientific fertilization. As nitrogen in food is of absolute necessity to the growth of animals, so nitrogen in the soil is indispensable to the growth of cultivated plants.

It is obtained by the soil in the form of ammonia from the atmosphere, or by the application of animal and vegetable matter and the manures called nitrates. The largest and most readily available supply of nitrogen is found in blood, meat-tankage, bones, sulphate of ammonia, nitrate of soda and nitrate of potassa.

By the process of burning vegetable matter, whether it be the grain and straw of cereals, garden truck, the root-crops or the fruit-bearing plants and trees, we drive off the atmospheric constituents and reduce the earthy matter to ash. The analysis of this ash gives the kind and quantity of earthy constituents which the plant in its growth and formation must derive from the soil. These ingredients agricultural chemists designate and divide into three classes as follows: Alkalies—potash, soda, lime, magnesia. Acids—phosphoric, sulphuric, silicic. Neutrals—chlorine, oxide of iron.

Our state laws, and those of other states, recognize but three ingredients as entering into the value of a commercial fertilizer, namely: nitrogen or ammonia, phosphoric acid and potash. While it is necessary thus to discriminate for the protection of the farmer, and while one ingredient has a higher chemical rating and moneyed value than another, yet the plant knows no such discrimination; that is, a perfect plant must needs have all, and one ingredient becomes just as necessary as another. If a soil could be found in which there is no silicic acid, the supply of that ingredient would be just as necessary as now it is found necessary to add potash, ammonia and phosphoric acid. Almost every farmer using artificial manures knows that the reason for designating only the above three ingredients, is because all the others are either found in all soils or they are readily available at a nominal cost. These other ingredients—however non-essential in the manufactured fertilizer—I will take up in order with a few explanatory remarks.

Soda. As is generally known this ingredient is found in common salt, known as chloride of sodium or muriate of soda. Soils not near the sea-coast are generally deficient in this ingredient, and, while it is a disputed point with some, there is sufficient evidence from results, ancient as well as modern, that salt can be used with good effect in connection with all our crops. Some absolutely demand it. Besides salt, sulphate of soda and nitrate of soda will furnish the same ingredient in connection with their valuable acids.

Lime. The purposes served by lime as a chemical constituent of the soil are at least of four distinct kinds.

1. It supplies a kind of inorganic food, which appears to be necessary to the healthy growth of all cultivated plants.
2. It neutralizes acid substances, and decomposes or renders harmless other noxious compounds.
3. It changes the inert vegetable matter in the soil, so as to gradually render it useless to vegetation.
4. It causes, facilitates or enables other useful compounds both organic and inorganic, to be produced in the soil.

While lime is found in many compounds it is needless to tell a Lehigh county farmer that the cheapest and most available is our common limestone or carbonate of lime. As is well known, it is freed from carbonic acid during the process of burning, producing a lime varying in quality with the character of the limestone. In connection with this ingredient it should be borne in mind that either bone or South Carolina rock contain about fifty to fifty-five per cent. of phos-

phate of lime, of which about one-half is lime. In using either dissolved bone or dissolved phosphate rock, lime is introduced in an available form.

Magnesia. This ingredient is found in most soils and is rarely applied as a fertilizer. While it is a necessary ingredient in plant life, yet if used largely it becomes decidedly injurious. One of the chief sources of magnesia for agricultural purposes is from magnesia limestone. It, however, need not be considered by our farmers.

Sulphuric acid. This ingredient is often used as a manure, and is most available in the form of sulphate of lime or plaster. The soil upon which plaster operates most beneficially are those that are light, dry and sandy or open, as they soonest admit the rain-water which dissolves and conveys it to the roots of the plants. Anyone acquainted with the manufacture of so-called "phosphate of lime," knows that the phosphoric acid is rendered soluble by the use of sulphuric acid, which, combining with the lime, forms sulphate of lime. Hence, by the use of soluble phosphates the soil is furnished with sulphuric acid.

Silica acid is common sand. By itself silica acid is insoluble, but compounded in the soil with potash, soda, lime and magnesia, it becomes soluble and forms a very necessary part of all plants.

Chlorine is a constituent of common salt (chloride of sodium) and from this source may be obtained in sufficient quantities for manurial purposes.

Oxide of iron. It is seldom that this ingredient is referred to as necessary application to any soil or crop, and yet experiments have made it evident that iron in the form of sulphate of iron can be used on certain crops with advantage.

Phosphoric acid. We come now to the consideration of one of the most important of all subjects connected with fertilization. Phosphoric acid forms about one-half of the ashes of wheat, rye, corn, buckwheat and oats, and nearly the same proportion of barley, beans and peas. In fact no cultivated plant can grow without it. The cultivation of our whole country has been such as to take away the phosphoric acid from the soil without returning it except in very minute quantities. Every hundred bushels of wheat sold contains (and removes permanently from the soil) about sixty pounds of phosphoric acid. Other grains, as well as the root crops and grapes, remove likewise a large quantity of it.

That this removal of one of the most valuable constituents of the soil has been the cause of more exhaustion of farms, and more emigration in search of fertile districts, than any other effect of injudicious farming, is a fact which multiplied instances most clearly prove.

Many suppose that soils which produce good crops, year after year, are inexhaustible, but time invariably proves the contrary. They may possess a sufficiently large stock of phosphoric acid, and other plant constituents, to last a long time, but when that stock becomes so reduced that there is not enough left for the use of full crops, the productive power of the soil will yearly decrease, until it becomes worthless.

This ingredient being so necessary for all crops, and all soils being more or less deficient, the important question for the farmer to ask is, how can I best return to the soil the needed phosphoric acid? If the farmer will for a moment consider that the bulk of the phosphoric acid enters into the grain which he feeds and sells, he must conclude that it is impossible to return to the soil an equivalent for what he has

taken out by the use of the stable manure of the farm. To raise paying crops the farmer must find his source of supply of phosphoric acid outside of the farm.

Phosphoric acid does not exist in nature in a free state, but is always found in union with the alkali bases, lime, soda, potash, magnesia and alumina, forming phosphate of lime, phosphate of soda, phosphate of potash, phosphate of magnesia and phosphate of alumina. The most abundant, most available and most useful in agriculture is the phosphate of lime found in the earthy part of bones, and a native mineral called "phosphorite," of which we have an abundant supply in the well-known phosphatic rocks of South Carolina, and, as lately discovered, of Florida. All animal fertilizers such as tankage, fish-scrap, etc., contain more or less of phosphoric acid.

As is generally known, the phosphoric acid—as well as other ingredients of plant food—must be in a soluble form before the roots of the plant can absorb it. In phosphatic rock it is doubtful whether any material portion of the phosphoric acid becomes soluble in the soil, and hence it is absolutely necessary that it be treated, after pulverization, with sulphuric acid, which, combining with the lime, forms sulphate of lime and leaves the phosphoric acid free, or, in other words, soluble. For quick action it is also necessary to treat ground bone and other animal matter in the same way. In time the insoluble bone and animal phosphate of lime will dissolve in the soil, especially if ground into a fine state, hence whether dissolved by sulphuric acid or undissolved, bones are the most valuable sources of phosphoric acid.

Potash. This, last but not least ingredient, is often deficient in the soil. Its deficiency may have been caused in two ways. Either it may not have existed largely in the rock from which the soil was formed, and consequently is equally absent from the soil itself, or it may once have been present in sufficient quantities, and have been carried away in crops, until too little remains in an available form for the requirements of fertility.

In either case the deficiency may have been made up and it may be supplied by the farmer in various ways. Potash, as well as all the other mineral manures, is contained in stable manure, but not (as is also the case with the others) in sufficient quantities to restore the proper balance to soils where it is largely deficient, nor even to make up for what is yearly removed with each crop. It is necessary to apply more potash than is contained in the stable manure of the farm.

Were we in a wood-burning country, wood-ashes would be a cheap source from which to obtain our supply of potash; but this supply not existing, we find the most available source in the German potash salts now largely imported into this country. The names of the potash products are kainit, kieserite and sylvinite, and the concentrated products of muriates of potash and sulphates of potash.

As in the matter of scientific knowledge, the farmer owes much to the untiring efforts of the students of science, so he is under obligations to the men who have given time and immense outlays of capital for the manufacture of fertilizers on scientific principles. In the absence of the possibility of each farmer being his own chemist, or the possibility of knowing the requirements of the soil of each farm and of each plot on the same farm, the most practicable and profitable method is for the farmer to avail himself of the first-class fertilizers manufactured, containing in the proper proportion and most available form the three

principal ingredients of a complete fertilizer as already described: phosphoric acid, ammonia and potash.

In this hasty and very incomplete description of the ingredients required by plants, there has been no allusion to method of application, quantities required by the different crops and the combinations best adapted for special crops. In a short essay it would be useless, in fact impossible, to enter into such detail, and all I can hope for as the result of taxing your attention, is that each and every farmer present at this institute will avail himself of the many valuable papers and books giving all the information that the science can furnish to-day. A "book farmer," so-called, may not be able to succeed from lack of practical experience in the mechanical work of the farm, but the time has come when it can be truly said that no farmer can succeed unless he secures and practices that information which he alone can secure from agricultural books and papers.

In conclusion, allow me to add that whatever are the circumstances and conditions, beyond the farmer's control, which have made his business unremunerative, there are circumstances which he may control, and one of the most important is the science of fertilizing. With better tillage, richer soil, and consequently larger crops, the farmer will surely be able to make ends meet with a free and independent living, and still better, stand a good chance to make the farm once more a paying investment. Poor farming will not pay; good farming will pay.

DOES FARMING PAY?

By DAVID R. HINDMAN.

(Read at Clarion County Institute.)

I think I hear some of you say no. How often do we hear farmers complaining of troubles, little petty things that dwindle into nothingness when compared with real trouble. They imagine their business pays less profit than any other occupation, and by continually harping on it, it soon becomes almost unbearable, and they would do almost anything to be freed from it. Men in all pursuits have trials, no life is complete without them. "But what can't be cured must be endured." Then why sit down and fold our hands and mournfully feed on the dim shadows that a little effort might sweep away, for thus the strong spirit is shorn of its might, and discontent becomes our master, whereas a little exertion on our part might drive those shadows which are as often imaginary as real into oblivion. Remember this life is what we make it. Men in all positions have their skeletons in the closet, but they should be kept there and not paraded before the public. Every cloud has a silver lining and if we have a little patience these hard times will pass, and won't injure any one much. Are we the degenerate sons of sires, that we can't face a few years of low prices, without whining about our deplorable condition, and trying to make every one think that, farmers are going to financial ruin? It is these years of hard times that try our mettle, and bring out the latent energy within us, which otherwise might sleep through life, and we would never know how much energy we possessed. There are too

many boys who are ashamed to take up anything that is not in the professional line.

Very little attention is given to the fact, that one should first find for what he is best suited in life, and then go ahead if possible. If you have talent and taste for a professional life, then follow that in which you can be most successful, and on that let your energies be concentrated. It seems to be the disposition of some farmers to court or envy the success of other business, this feeling nourished and agitated results in them being dissatisfied with their own occupation. We should not allow ourselves to be thus deceived if their business is so profitable. Why do so many of them fail? In making a comparison between farming and other pursuits, how does the farmer ascertain their per cent.? First, they want to live comfortable, well fed and clothed. Have sleigh, buggy, carriages, etc., as well as all the necessary conveniences around the house, all dressed in the latest fashion and so forth. When these expenses are all paid, then he thinks his profits only consists in the cash he has at the end of the year. It is true our farm property has suffered a shrinkage in value in the last few years, but they answer us the same purpose that they would if they were now valued higher. Our Short Horns, Jerseys, Clydesdales and Percherons are yet salable at reasonable prices. Yet it is not merely a question of dollars and cents. See the advantages a farmer's life gives in the training of his children. We must judge the future by the past and present, who on an average have been the most successful in all pursuits in life. It has been the farmer's son and it can be attributed to no other cause than the early training of industry and economy which has prepared them for the success in life which they have reached. And their sons not having early the training which they received are not able to hold the position of their fathers, but are again succeeded by the farmer boy. It seems as if the farm was nature's school for developing both mental and physical power in the youth, which prepares so many of them for the successful part in life's battle. Then let us let well enough alone, and keep right along with our business, for nature rewards the agriculturalist in proportion to the effort he puts forth to merit her favor.

If we calculate our profits the same as the business man we will find the farmer's income will compare favorably with the rest of mankind, and as long as the farmer is able to raise his family well, and lay up a competency for old age, we think farming pays. But in order to thus succeed, he must understand the business, and reduce his knowledge to practice.

PROFITABLE FARMING.

By DANIEL DEVLIN, *Otter Creek, Pa.*

(Read at Mercer Institute.)

That there is a system of farming costing no more labor, requiring no extra outlay, and more remunerative to the farmer than that practiced by many at present, is what this paper will try to show.

Profitable farming requires to be conducted on true and honest prin-

ciples, demanding of the soil only that which it is capable of producing, and arranging the mode of farming to suit existing conditions.

A certain knowledge of soils and plants becomes necessary to successful farming.

Plants are divided into orders and sub-orders or classes, and some orders of plants require less nutriment or plant food for their growth and maturity than others.

The grasses require less nutriment than the grains; oats requires less than wheat, wheat less than corn, etc.

Soils also differ in their fertility; some are poor and almost barren, while others are rich and productive. Plants requiring but little nutriment should be grown on the poor soils, those requiring a greater amount on the richer soils.

The farm should be fitted by the proper application of manure to grow full crops of such plants as are adapted to its soils, without which there is little or no profit. And as machinery in modern times is a potent factor in planting, growing and gathering the crops, the farm should be as free as possible from stumps, stones or other obstructions, hurtful to machinery, or causing a waste of ground, or delay in the prosecution of work.

Although plants are differently constituted, their work is the same everywhere; individual growth, and the production of seeds to perpetuate their kind, being their chief occupation or sole design.

To aid and facilitate plants to perform their work in a more vigorous or fruitful manner is plant culture, or that branch of farming having for its object the care and growth of plants.

The plants of agriculture in this section, are chiefly restricted to fruits, grains, grasses, vegetables, etc., all of which can be grown with profit to the farmer, if proper care and attention is paid to their cultivation.

To grow grains, the ground must be rich, thoroughly plowed and properly fitted to receive the seeds; conditions which are necessary to promote a healthy and vigorous growth.

The planting should be accurately done and in proper time, using for seed, grain of varieties of the different cereals that mature early and are hardy and prolific. If due regard is paid to the preparation of the soil and the selection of seeds, full crops can generally be grown, and are essential to profitable farming.

The grasses have a greater range of adaptability to soils than the grains; dry soils are suitable for some, damp for others, while a few grow on poor or wet soils.

By fitting the soil to produce a strong and abundant growth, the grasses become of great value to the farmer if properly utilized. Grasses, like all other plants, absorb from the soil, by their roots, decomposed mineral and vegetable matter in a soluble state; this is carried by the stalk to the leaves and there manufactured into cellulose, starch, albuminoids, etc.; the cellulose for further growth of the plant, and the starch and albuminoids for the seeds. When growth ceases the cellulose composing the stalk becomes fixed, hard and woody, and when the stores in the leaves of structural matter for the seeds are exhausted, only a woody texture of ripened cellulose remains.

For pastures a mixture of the grasses is preferable, which may consist of red and white clover, timothy, june-grass, red-top, etc.

While some of these grow and mature early, others remain in the

grass state much longer, thus affording a greater supply and a better quality for food for stock.

For meadows, the grasses should be kept separate as much as possible, as the disparity in their growth renders a mixture unfit for hay; some varieties being almost matured while others are growing. To make nutritious hay all grasses should be cut as the heads appear, they then contain the greatest amount of animal nutriment, the plant food manufactured for the seeds and further growth of plant is still in a transitory state and is yet easily assimilated by animals, nor has the cellulose already forming the stalk yet become fixed or woody, which renders it unfit for animal food; grasses cut at this stage of growth will grow and fatten all kinds of stock requiring it.

The nutritive qualities of grasses decrease as the plants mature, and when ripe little remains but that which is contained in the seeds. Hay made at this period of growth is of but little value for feeding purposes; stock depending entirely upon it for subsistence fall away or grow poor; an evidence of an insufficient supply of nutriment in the food, as a consequence the farmer cannot have profitable returns.

Clover has a larger percentage of nutriment than the other grasses, and if cut at the proper time is of more value to stock men.

In this section clover should be cut by the fifteenth of June if intended for hay purposes, commencing when the heads first appear and terminating when the crop is half in bloom.

Clover should, if possible, be the exclusive hay diet of sheep, calves and milch cows, as it affords as great a supply of nutriment and produces as beneficial results as the best pastures, and besides being valuable as a hay crop there can also be grown a crop of seed which gives additional profit to the farmer.

Stock is an important branch of farming, and if conducted right affords good returns to the farmer.

Breeds of the different classes of animals that are best fitted for the intended purposes should be selected for stock raising. For meat producers, those breeds that have good growth, early maturity, and possessing the largest amount of the most valuable meats.

For dairy purposes cows that produce large quantities of good rich milk. For wool growing breeds of sheep should be selected having the greatest combined values of wool and mutton products.

In producing beef breeds, cattle possessing the qualities most requisite for this should be employed such as Durham, Devon and Hereford.

To grow beef profitably calves should run with the cows, and where cows have a superfluity of milk, milking should be done until the calves become large enough to utilize the whole product. In summer they should have good pasture of sufficient growth to allow them, in a reasonable time, to obtain a proper supply of food.

Where pastures are short and more traveling required to obtain food the consumption is greater and profits less.

In winter they require good shelter and should be fed hay, clover if possible, three times a day. The calves should not be taken from the cows until weaned, which is done by the cows at the proper time; most cows wean their calves when about a year old; calves raised in this way grow from the start and are neither dwarfed or stunted.

At one year old they weigh eight or nine hundred pounds. The best strains, with the care taken by some farmers, weigh, at one year old, one thousand pounds, at two years old with proper food and shelter,

they weigh from fifteen to eighteen hundred pounds, at three years from twenty to twenty-four hundred pounds.

On farms where the milk product is employed for butter purposes, calves, if raised, must be hand fed, they should receive the milk as it comes from the cows, for at least a month, five or six quarts at a time, twice a day; they should also be fed hay or turned on pasture, as circumstances require; the change to skim milk should be gradual so as to keep them growing, and without this there is no profit; grain should be fed. Corn and oats mixed and ground is the best feed for calves, small quantities of which are required at first, increasing until at the age of three months, two quarts per day is fed. Calves should receive the milk ration until six months old, and the grain at least for a year.

Calves raised in this way not having their growth materially injured, class next in profit to those whom nature has fed and fitted. Calves never should be fed sour milk, ripe hay or any improper food, as it permanently injures them.

Successful dairying requires that the quantity of milk given by each cow be sufficiently large, and that the products manufactured therefrom be of the best quality; otherwise there is little or no profit. As cows of no one breed of cattle are more permanently fitted for the dairy than those of another, it follows that the common cow or those most numerous must be utilized. Cows of whatever breed that have been kept fat when young are poor milkers, and those that have been kept in medium or only growing condition are generally good milkers. As butter is one of the leading products of the dairy and as the profit to the dairyman depends on the quality, it becomes necessary that great care be taken in its manufacture.

The milk when taken from the cows, should be strained and kept at a temperature ranging from forty-five to fifty degrees, until the cream is removed, and this should be done at most in twenty-four hours; the cream must be churned at once if the best grade of butter is desired; the cream of each milking should be churned separately; where the cream of several milkings is put together for churning, the atoms differing in age and ripeness will impair the quality of the butter.

Where the milk is kept at too high or too low a temperature, or where the cows are fed improper food, such as ripe hay, straw, etc., or kept in poor condition, the butter will be of an inferior quality, and when sent to market will sell at about one-half the price paid for choice butter.

Cheese is another important product of the dairy, and if properly made is more remunerative to the dairyman than butter; to make good cheese the milk must not be skimmed, the utensils used in its manufacture must be kept scrupulously clean, the temperatures required at each stage of its manufacture must be strictly complied with, the manufacture or fitting of the cheese must be done in a skillful and proper manner, and if necessary care be taken the cheese will be of best quality.

In some dairies the milk is skimmed before making it into cheese, and annato is used to give it a strong rich color, and lard for shortening, making a compound but little sought for and unfit for table use.

Shall I say that through ignorance or the greed of gain, large quantities of those valuable dairy products are rendered unfit for use and their values thus depreciated.

Raising horses is a source of much profit to the farmer, if proper attention is paid to the business. Soundness, durability and style are

points of much value in horses, and should not be overlooked by breeders. Animals of either sex inheriting imperfections should not be used for breeding purposes, as their offspring would be more or less affected and values diminished.

And as a proper selection of animals and plants must be made, in order that farming may be profitable, it is equally necessary that the farmer should have the proper acquirements or capabilities to manage, or conduct the business. A knowledge of the habits and wants of animals and plants, with a disposition favorable to their growth and development, manifesting its earnestness in acts of aid and comfort in the struggle, is necessary. He should also be so fitted morally that it would be contrary to his inclination and belief to over load or run horses, or to be unkind or vicious in any way towards animals; qualities and accomplishments which are of vital importance in profitable farming.

Stock of all kinds require a sufficient quantity of food of a proper quality for their growth and maintenance, when growing they are their own guides as to what is sufficient or proper; their sense of smell teaches them what is nutritious or not, and obedient to its instructions they only use that which it designates as beneficial, unless compelled by hunger, to disregard its teaching.

In winter when hay is fed ripe, hay or straw which their sense of smell teaches them to reject, should not be used for feeding purposes.

Cut straw and chop, device of artful man, may deceive their sense of smell and be consumed for food, the nutritive qualities of the grain inducing the animal to partake of the straw which is valuable for food and injurious to the system.

Cob meal or cobs in any way are worthless for feeding stock. The proper place for corn cobs, straw, ripe hay and oil-cake meal is the manure pile. When decomposed they will be of some value as plant food.

Fattening stock by impressing it with the belief that food is nutritious, when not, is a deception and those who practice it have but small profits.

And why should farming not be profitable, when all the elements of nature teeming with life and energy, skilled in the structural mechanism of plants and animals, but ask the farmer to plant the seeds. The sun by his rays of heat calls forth the plants and daily feeds them carbon. The shades of night bring rest, to animals, their needed rest; to plants, refreshed with crystal dews. The breezes waft with gentle breath the fertilizing elements upon the blooming plants. At last the maturing energies of nature are called upon. The leaves wither. The stalks become dry. The fields of ripened grain appear. The farmer has but to put forth his hand and receive the bountiful gifts.

OUR PUBLIC ROADS.

By GEORGE T. HENERY, *Clarion county.*

(Read at Clarion County Institute.)

An eminent writer says: The road is that physical sign or symbol by which you will best understand any age or people.

If they have no roads they are savages, for the road is the creation of man and the type of civilization.

The best roads in the world to-day are those of England, France and Germany, the excellence of which is due to the fact that these countries were the first to awaken from the long sleep of the dark ages, and the growing rivalry between them necessitated attention to their roads for the proper prosecution of both their military and mercantile interests. In each country they early came under the national supervision. The results of which are seen in the most splendid highways in existence, costing the least to maintain, and in every way the most satisfactory and economical for those who use them.

No country has a greater road mileage, in proportion, than the United States. But, while with characteristic American push and hurry, the most extensive means of communication and intercourse have been provided, we have suffered the consequences of a lack of any general system of public policy covering the location, construction and maintenance of our public highways. American roads are far below the average, and they are certainly among the worst in the civilized world, and always have been, largely as a result of permitting local circumstances to determine the location, with little or no regard for any general system, and haste and waste and ignorance in building.

A good road is always to be desired, land is a source of comfort and convenience to every traveler. Good roads attract population as well as good schools and churches. Good roads improve the value of property, so that it is said a farm lying five miles from market connected by a bad road is of less value than an equally good farm lying ten miles from market connected by a good road.

A larger load can be drawn by one horse over a good road than by two horses over a bad road. Good roads encourage the greater exchange of products and commodities between one section and another.

The amount of taxes levied in Porter township for the last ten years is as follows: Work tax, nineteen thousand three hundred and eighty-six dollars and seventy cents. The amount of cash levied is five thousand four hundred and ninety-three dollars and sixty-two cents; making in all, for road purposes, twenty-four thousand eight hundred and eighty dollars and thirty-two cents. Has this money been judiciously expended? Or has it been stood out or crossed out? I think some of both.

One of the bad effects of our present road system is, in the spring of the year, after corn-planting, the supervisors notify the citizens of the time and place to commence work, and every one in the neighborhood goes to the roads: from thirty to fifty men and boys come in the morning, perhaps one team and plow. How can one man manage this crowd on the road? As Judge Brinker says, "If he has anybody on the farm who is no use to him, he sends him to the roads," and I think this is the rule and not the exception.

How can this system of roadmaking be improved? First, by levying a cash tax the same as other taxes are levied, and giving the party who is to pay the tax the privilege of working out the tax, if he will do it at the right time and for the same compensation other good men would do the work for. All work to be let by contract. The plow and shovel brigade should be a thing of the past. With the improved machinery for making roads, the one-half of the tax will make more and better roads, if the right kind of men have charge of work. You have the remedy in your own hands, the ballot-box. Elect none but the best men, men who will see that the tax is properly expended and at the right time. In the spring of the year, the earlier the better, and see that the road is kept in good repair, properly drained, no ditches for the water to stand in and soak through the road. Let every taxpayer take an interest in the road that runs through his farm, and turn off the water on the road instead of running after the supervisor to do the work, and we will have better roads.

UNDER-DRAINING.

By WILLIAM M. GLENN, *West Sunbury, Pa.*

(Read at Renfrew Institute.)

The first mention of under-draining is by Oliver de Seres of France, in 1600. He recommended that drains to be dug to a depth of three or four feet, half filled with coarse gravel and the balance of the ditch with the dirt thrown out.

Walter Bligh, an English writer, in 1650, recommended drains to be dug four feet deep, filled partly with coarse gravel, covered with rye straw, with twenty inches or two feet of dirt placed on the straw.

The next record of note is that of Joeseeph Elkinton, of Warwickshire, England, in 1764. He concluded that bogs could be drained by under ditches and began the work, using coarse gravel and stones, and eventually board drains. He introduced what was afterwards called the Elkinton system of drainage, that is, to cut off the water supply to wet land by laying drains on the water supply side.

The use of tile was first introduced by James Graham on his farm in England, in 1810. The tile were made by hand, the clay being rolled out in thin cakes and formed over a block, giving them the form, a horse shoe, and they were and are still called horse-shoe tile. They had also flat bottoms made of clay of suitable dimensions to set the tile on. Both tile and bottoms were baked as hard as we usually burn tile now; and Mr. Billingsly, of Indianapolis, says these tiles laid eighty years ago are doing good work to-day.

Thorough draining was first introduced by a Mr. Smith of Deanston, Scotland, in 1833, and included the laying of the drains at such a distance apart as to secure the thorough drainage of the soil to a depth of three or four feet. This was called the "new drainage," and the fame of it spread rapidly over Scotland and England. In 1840 the English government appropriated two million pounds (ten million dollars) to be loaned to farmers to carry forward the work of draining.

About this time Mr. Irving introduced a machine for making drain

tile, which was operated by hand, making the horse-shoe tile. In a few years machines were made to be operated by horse power.

About three years, Mr. Robert Thomas, of Indiana, visited England, and he estimates that seventy-five per cent of the farm land of England has already been drained and the work still going on.

In the year 1835, John Johnston, of Geneva, New York, constructed the first under-drains of which we have any knowledge in this country. They were made by using stones to make the water ways. In a short time Mr. Johnston sent to Scotland, his native place, for drain tile. He soon brought over a hand machine to make his own. For years he was the only patron of his factory. His neighbors thought him insane or, to use a latter day term, they thought him a "crank." Mr. Johnston knew what he was about, however, and kept on his way, until at the time of his death, which occurred a few years ago, there were fifty miles of under-drain on his three-hundred-acre farm.

The enormous crops he raised and the ease and comfort with which he worked his under-drained land, at last had its effect upon his neighbors: they began to drain and Mr. Johnston's little machine had to be multiplied many times to supply the demand.

In 1848, John Delafield, of Seneca, New York, made and operated the first horse power mill to make tile ever used in this country. These tiles were of the horse-shoe pattern and set on boards or flat clay bottoms.

The horse-shoe tile is no longer made. All sizes are now made round, and about one foot long.

Owing to the interest taken in farm drainage, the establishment of tile factories in this country from 1850 to the present has been marvelous.

Ohio, our nearest neighbor on the west, has five hundred and fifty factories, turning out annually sixty-five million tiles, thirteen thousand miles of under-drain. Indiana and Illinois each manufacture more tile than Ohio and the demand still increasing. Most of these factories run by steam power.

Iowa and Michigan have each about one hundred factories while western Pennsylvania has but four.

There is perhaps no part of this great country of ours that needs under-draining more than the bituminous coal region with which we are here surrounded. The rain falls and descends through the ground until it reaches the almost impervious fire clay underlying the coal, when it is thrown out and chills and wets the land below, making it unproductive.

Wet ground, be it ever so full of plant food, will not produce a crop. Plants want damp, not wet, soil. What we want is to remove the surplus water from our fields and we do not want it to run off over the surface and carry off the soil with it. If we lay a drain in the sub-soil that will carry off all the water that reaches it, we have provided for the lowering of the water line to the level of that drain.

Then when the rain falls, bringing with it from the atmosphere (as chemists tell us) the fertilizing elements of the soil, they are not allowed to run off over the surface and lost, but the drain having emptied the soil of its surplus water, there is room for the rain water in the soil and in the percolating through it to the drain below, it filters and leaves its plant food just where the plants can take it up.

Go to the outlet of a drain and see how clear the water is after a heavy rain.

Air cannot enter the soil to loosen it below the water line. Plant roots will not go into the water for food, especially if that water is cold.

A deep, as well as a fertile soil, is what we want. The deeper the soil the better the crop. Now, if our land be clay—and clay land is the best in the world—there is no way to deepen the soil but by means of under-draining.

If the excess of water be removed, say from two and one-half or three feet of the surface, we have all that to work upon. We can plow a little deeper each year and eventually have all the depth we need, but to try to deepen the soil without providing a way for the escape of surplus water below, is only to deepen the mud. Another well known effect of under-draining is that crops suffer less from drouth on under-drained land.

The water does not stand on it in the spring of the year until the sun evaporates it, and then bakes the ground as hard as iron.

The water being removed the frost in winter penetrates and loosens it, and the air in spring will follow the descending water down and help loosen the soil, and we all know that loose ground is more retentive of moisture and better fitted to produce a crop than hard ground.

In under-draining we are fortifying ourselves against dry as well as wet seasons. The condition of the soil improves year after year by draining. The dry strip over a drain will widen for many years.

When we lay a drain it is not a temporary expedient to be gone over the next year, but a permanent improvement, that is, if it be done with care and good material.

Some twenty years ago we dug a drain about thirty rods long on the farm where I now live and where I have spent my entire home life. We dug it about sixteen inches deep, made the water-way of stone. It drained a narrow strip of land for a few years, but being too shallow and the mice working into it from the surface, it soon filled up and left us where we started.

Some years after that we had a two-acre lot cut off from the rest of the farm by the public road on one side and an open ditch on the other. Swamps and old run channels compelled us to mow it in three pieces when in grass.

We dug two drains partly through it (we had learned to dig deeper by this time) in one of these we made the water-way of stone, the other of wood; tile at that time could not be had. Five years ago we finished the draining of the piece with tile. Since that time we have had it in corn, oats and grass, always a good crop and when we go into it now with the mowing machine, we do not divide it into three parts. We look for the wood and stone part to fill up, but the tile will be good for centuries.

Another improvement since tile in reach was the digging of a ditch from our barn up to the out-crop of a coal vein, then running branches both ways along the out-crops of the coal. Now instead of wet ground below the coal drip we have dry ground.

Instead of wading our stock through mud to a distant watering place we have water in the barn-yard nine months in the year. A number of our neighbors have brought water to their barns the same way and many more can do the same.

Most farms have some land that is naturally drained: let us put our manure on that part until we get some of our wet land drained.

If we have no place to put our manure but on wet land, let us con-

sider whether it is easier to spread it on the land or dump it in the creek and then let us do the easy thing.

Every pound of manure on dry ground will count, but on wet ground four-fifths of it is lost.

If we can get tile let us use it; if we can't, let us use wood and stone. If these materials are carefully put in they will last many years. We have drains on different parts of the farm that have been doing good work for ten years; but if we can get tile and put it in with intelligence and care, we are building for all time. We have tile drains on our farm working to-day, that I believe will continue to work on down through the centuries of time, until Gabriel's trumpet shall relieve them from further service. If our farms were properly drained, we could go to work earlier in the spring; we could cultivate our hoed crops sooner after a rain; we could put our manure where it would do most good; we could raise bigger crops; we could pay our debts and we would not care whether the Alliance men get their sub-treasury filled with dollars to loan at two per cent. or not, for we would not want to borrow.

SOME THINGS OF INTEREST TO FARMERS AND OWNERS OF REAL ESTATE.

By Hon. J. C. BROWN.

(Read at Mercer Institute.)

"Does farming pay?" is a question often asked and as variously answered, as varying circumstances and conditions surround and modify each case or class of cases. "The thing that hath been, it is that which shall be, and that which is done, is that which shall be done, and there is no new thing under the sun." The intelligent, industrious, thrifty farmer, under favorable conditions, makes his business easy, as he always has done, while his less industrious, less thrifty neighbor, under the same or less favorable circumstances, either makes both ends meet with great difficulty or falls behind in the race, and ultimately succumbs to bankruptcy. But while it is true as a general proposition that the condition of farmers in this country, as a class, at the present day, in some respects is but the counterpart of their condition in time past, that individual is not a close observer who has not already discovered that the farming interests of our country as compared with their condition, fifteen or twenty years ago, are fearfully depressed, and that the number of truly successful legitimate farmers, as compared with those who are doing no more than making both ends meet, or are actually falling behind, has greatly diminished during that period.

Neither is that individual a close observer who has failed to note the fact that the current price of average farm land, unaffected by more than ordinarily favorable surroundings, has depreciated during that period from twenty-five to fifty per cent. Why should these things be so? Who can solve the knotty problems? It will not do to charge it all up to the account of a return to specie payment, a con-

sequent settling back to normal values. As early as December, 1871, nearly twenty years ago, the premium on gold had fallen to a fraction over ten per cent. and many months before the first of January, 1879, when resumption became an accomplished legal fact, the premium on gold had almost entirely disappeared. Other causes must have operated to bring about the depression to which we have referred. Who can tell us what they are and who can prescribe remedies?

Among these causes, doubtless, has been the opening up of a vast acreage of fertile land in the great west, and the consequent unprecedented increase in the aggregate of farm products. In 1870 the total acreage of wheat in the United States, in round numbers, was 11,000,000, in 1890 it was 36,373,000, and the previous year it was even greater by more than 2,000,000 acres. As against the farm of the eastern and middle portion of the United States, this immense increase in the acreage of cheap and cheaply cultivated land in the west, together with cheap transportation and discrimination in freight charges, has operated with telling effect. But all these, added to the resumption of specie payment, unfavorable as they have been, are not adequate causes for the existing depression in real estate and in farm products.

Furthermore the observing man has not failed to note the fact that while the farming interests of the country are depressed, and as a class farmers are poorer than they were twenty years ago, other interests have prospered in a most remarkable degree, so that the increase of the aggregate wealth of the country is simply marvelous. It has been estimated by some curious statisticians, taking official facts and figures as the basis of their calculations, that during the period from 1860 to 1880, notwithstanding the immense losses and waste incident to the most destructive war of modern times, and the entire wiping out of four billions of slave property, the wealth of the country increased at the rate of \$250,000 per hour for the whole period. Truly this rivals the pictures of the Arabian Nights, and there is nothing in the story of the lamp of Alladin to surpass it. It is unparalleled and unprecedented. At this time the aggregate wealth of the country is not less than \$65,000,000,000. Some place the figures much higher. The lamentable thing about all this, however, is the indisputable fact that the great bulk of this marvelous wealth is rapidly passing into the hands of a few individuals. A table has been recently completed by a well-informed statistician, for the purpose of showing how the wealth of the United States is distributed, and this table is full of the most startling facts and figures. It shows that two hundred persons are estimated at more than \$20,000,000 each, and that one man during this century acquired within less than the ordinary lifetime of a single individual, a sum larger than the assessed valuation of four of the smallest states of the union, and more than the assessed value of the entire country at the time of the adoption of the national constitution. Two or three others are making rapid strides towards the financial goal at which their private fortunes will rival, if they do not surpass, that of the late W. H. Vanderbilt. By this table it is shown that 400 persons own \$10,000,000 each; 1,000 persons, \$5,000,000 each; 2,000 persons, \$2,500,000; 6,000 persons, \$1,000,000; and 15,000 persons, \$500,000 each. This table also shows that 31,100 persons own and control \$36,250,000,000, or more than half of the entire wealth of the country, as usually estimated. What a magnificent exhibit of the results accomplished by organized and confederated capital! How

threatening, moreover, to the well being of society and the individual interests of the masses!

Farmers are not communists. Sensible men do not adopt their fanatical notions as to the distribution of property, nor do they believe that an equal per capita distribution of the country's wealth to-day would remain intact the first twenty-four hours after the distribution; but can it be possible that a financial system under which such glaring inequities spring up can be perfect? Is it not rather clear to the ordinary mind that something is wrong which calls for readjustment? What means all these evidences of unrest, especially on the part of farmers? What mean all these frantic efforts at organization under variously emblazoned banners, and differing platforms, but all tending in the same common direction? What means the great political upheaval of 1890, by which the popular branch of Congress has been so thoroughly revolutionized? Do you tell me that these things are but passing episodes, incident to the history of a republican form of government, or an exhibition of the handy work of unscrupulous demagogues? Do not be deceived. They are not the evanescent ebullitions of an unduly and unnecessarily excited populace, but an agitation that has come to stay, till at least some of the wrongs which the oppressed interests of the country have long and patiently borne have been righted.

Possibly I will be met with the flippant rejoinder, "what are you going to do about it?" Can you bring about general prosperity by legislation or cure the ills by which the body politic is afflicted by acts of congress or assembly? We readily admit that more than these may be necessary to bring about desired results, but who doubts that unwise legislation, national and state, has had something to do with the gross inequalities among our people to which reference has already been made? No one who loves his country will spend much time in deploring the existence of our public debt, so far as it was necessarily contracted to save the nation's life, however much they may deplore the causes which created that necessity. The re-united country is worth infinitely more than it cost to save it. But has the management of our public debt always been calculated to promote the general good rather than that of a class? How have the farming and landholder's interests been affected by its management? We bring no railing accusations against congress. Mistakes are not incompatible with honesty of purpose. Mistakes made while the war lasted, we are disposed to pass over without severe criticism. "We were not then studying the philosophy of trade relations, but how to save the nation's life."

During a few years immediately following the war, as will be remembered by those of us who were old enough at the time, what a wonderful era of prosperity, in almost every branch of business, and especially in that of agriculture, prevailed. The government was then raising large revenues and paying out immense sums of money. The circulating medium, including the class of bonds which passed from and to hand as money was abundant. Every body who had anything to sell sold it without difficulty at satisfactory prices. The demand for labor was active, and wages good, and land sold readily at high prices. It was, possibly, unreasonable to expect that this state of affairs should be kept up indefinitely. The necessary steps looking to the return to specie payment, a thing desirable in itself, and other inevitable causes forbade any such expectation, but as we verily be-

lieve, unfriendly, and therefore unfortunate legislation rudely and unnecessarily checked the prosperity of some of the leading interests of the country including agriculture, and at the same time gave to the moneyed interests of the country advantages which started our money kings on the highway to marvelous prosperity. To a few of these legislative blunders let me call your attention briefly.

The first in the line to which we shall refer is the act of March 1, 1869, known as the "act to strengthen the public credit," by which the government was pledged to pay in coin or its equivalent, all obligations, notes and bonds, except those where the law authorizing their issue stipulated that payment might be made in "lawful money." We do not forget what this act did towards enabling the government to re-fund a large portion of the public debt at a lower rate of interest than existed when the act was passed; nor what it did towards hastening the resumption of specie payment. Nor has the country forgotten the egregious blunders subsequently made by congress in the re-funding of our public debt in the way of understanding the ability of the government to pay off its bonds, and hence in extending the period at which they matured and are to mature, so far into the future as to cost the government, in many millions of money in the shape of unnecessary premiums and interest. Making due allowance for everything valuable to the country accomplished by the act referred to, it was nevertheless an undue concession to the bondholders and moneyed men of the country, and a severe blow to the owners of real estate, to farming interests, and to the debtor classes generally. Prior to the passage of this act, concessions had already been made to the purchasers of government securities, notably the exemption from taxation—which ought to have been sufficient to make them willing to accept from the government payment in money of equal value with that with which they purchased their securities.

Following the act of 1869, came the act of 1873, demonetizing silver, an act so infamous in its character that no public man of repute has to this day been willing to father the measure. The history of this act is as remarkable as it is discreditable to the Forty-third Congress, by which it was enacted. A revision of the laws had been previously ordered, and the report of the commission came before the Forty-third Congress. The commission had been simply authorized to make a code including the recent laws, and leaving out what had been repealed. No authority had been given to make any change in legislation. The necessarily voluminous report of the commission was read principally at night sessions, when few members were present, and probably those who were present found it impossible to follow the reading, and know with certainty whether changes were being made or not. To do so would have required careful comparison of every section with the whole seventeen volumes of the statutes. No act of congress, had ever passed demonetizing the silver dollars, or suspending their coinage. When the revised statutes came to be printed, it was found that several changes had been made, and among those was one leaving out any provision for coining American standard dollars. President Grant signed the bill embracing the work of the commission, but in justice to him, it should be said that it was not until months afterward that he was made aware of the fact that by that act silver was demonetized. That the whole affair, however, was purely an accident, requires the exercise of much of that charity which "thinketh no evil." If there has ever been anything dishonest connected with "the dollar of our dad-

dies," it was probably this disastrous manipulation of the act of 1873. First our public debt was made payable in coin, and then followed the demonetization of an important part of our coin, which had been recognized as good money even before the day when the patriarch Abraham weighed out to Ephron, in payment of the burial place of his wife Sarah, the silver which he had named in the audience of the sons of Heth, "four hundred shekels of silver, current money, with the merchant." The disastrous effects of this act soon began to show themselves in the rapid decline in the prices of much property and particularly of farm land and farm products. Wages of labor went down, and almost everything was depreciated as measured by the gold standard except, government securities, private debts and gold itself. The capacity to pay was crippled; the accumulations of years in many cases suddenly disappeared under the hammer, and while the debtor may have been rendered homeless, the creditor smiled serenely over the enhanced value of his accumulations and the rapidity and ease with which they grew upon his hands. Landowners and the debtor classes did not expect to wholly avoid the inevitable depreciation in the value of their real estate, or the reasonable enhancement of the relative value of their outstanding obligations, and the corresponding increased difficulty attending payment, as legitimate results, of a return to specie payment, and the gravitation towards normal values, but with otherwise friendly legislation, the disastrous results to their interests which followed, might have been largely avoided.

The war between the friends of silver money, and the gold monometalists, broke out fiercely after the passage of the act of 1873, and it has raged with more or less intensity till the present and is not ended yet. Every farmer and owner of real estate is deeply interested in the final issue. The act of February, 28, 1878, providing for the coinage of not less than \$2,000,000 nor more than \$4,000,000 in silver dollars, per month, to be a full legal tender, passed after a fierce struggle, partially, but only partially, corrected the wrong perpetrated by the act of 1873. The government has been careful to keep the coinage of silver dollars, under this act, close to the minimum rather than the maximum amount authorized.

The act of July 24, 1890, providing for the purchase by the government of 4,500,000 ounces of silver bullion per month, should so much be offered, at the market price thereof. The issuing of treasury notes in payment thereof, was another important step in the direction of atonement for the wrong done by the act of 1873, but full justice has not yet been done, and the conflict continues. The free coinage of silver, not necessarily for all time upon the exact legal ratio now existing between gold and silver, but upon a fair and equitable ratio, to the end that gold and silver may continue to do service as circulating medium on both a legal and actual party, is what is demanded by the farming interests and needed by the industrial interests of the country generally. The farmer's interests are subserved by an abundant supply of good money, ample at least for the convenient transaction of legitimate business. When money is scarce its purchasing power increases, and the value of commodities, including land and farm products, as measured by it, depreciates. When it is abundant it naturally finds its way among the people, stimulates business and advances prices. We readily admit that it is much easier to establish this statement as a practical fact, sustained as it is by financial history of this country and all civilized countries, than to explain definitely

how it comes about. Whether money be plenty or scarce, it is very true that an individual must have something to exchange for it, or receive it as a gift before he can lawfully or honestly obtain it, but the admitted fact remains, that the quantity of money in a country as well as its quality, has much to do with its purchasing power and the regulation of prices.

But some friend of a single gold standard will reply, "The free coinage of silver in this country will inevitably result in the withdrawal of the gold now in circulation, and to that extent cause a contraction of the currency and a corresponding depression in the price of commodities, including land and farm products." To this we reply that no such result need necessarily follow the free coinage of silver. If the legal ratio between gold and silver money, now existing is not such as to make certain their circulation as money upon a complete parity, let a proper readjustment of the ratio be made which will certainly secure that result. Let free coinage be adopted by the United States, and then let an earnest effort be made to secure an international conference for the purpose of readjusting the ratio if necessary. Don't discredit silver and then ask other nations to join in forming a new ratio. But even upon the basis of the ratio now existing, official facts and figures do not show that the increased coinage of silver, the increased volume of silver certificates, or the increased purchase of silver bullion, has had a tendency to drive gold out of our circulating medium. When the act of 1878, above referred to was passed, it was gravely predicted by Wall street and gold monometalists generally, that the effect of the act would be to drive gold out of the country, and leave us with a contracted, instead of an inflated currency. Official figures show that the reverse of this result has come to pass. We have not before us official figures showing the exact amount of gold in circulation at the date of the passage of the act of 1878, but on the first of October, 1880, the gold coin in circulation was \$261,320,920, and the gold certificates \$7,480,100, or an aggregate of \$268,801,020. On October 1, 1890, the amount of gold coin in circulation was \$386,939,723, and the gold certificates, \$158,014,739, or an aggregate of \$545,044,462, an increase of gold coin and gold certificates in ten years of \$276,243,442. How does this tally with the predictions of the gold monometalists in 1878? Again when the act of July 14, 1890, already referred to, was under consideration in congress, the same dolorous predictions were heard from the enemies of silver, and how have they been justified by the practical workings of that act? On July first, 1890, the gold coin in circulation amounted to \$374,396,381, and the gold certificates \$131,380,019, an aggregate of \$505,776,400. On the first of October, 1890, three months afterwards, the gold coin in circulation was \$386,939,723, and the gold certificates \$158,014,739, an aggregate of \$545,044,462, or an aggregate increase in three months of \$39,268,062. Does this look as if the tendency of the act of 1890 was to drive gold out of our circulating medium? It is true, that during a few months succeeding the month of October, 1890, the remarkable stringency of the money market in Europe as well as in America, resulted in an inconsiderable outflow of gold from this country, but financiers generally do not charge up to the account of the silver bill of 1890, this outflow, but admit that the stringency of the money market was in some measure relieved rather than intensified by the act of 1890, and the outflow of gold rendered less rather than increased.

But there is another view of the case in which the increased coinage of silver becomes a matter of special importance to the farmer. The price of the great staple, wheat, is largely determined by the price at which our surplus can be marketed in those countries where a sufficient quantity is not produced to supply their own demand. We will not stop to discuss the point at length whether or not this should be the case. It is a growing opinion among farmers, that by some plan of co-operation a system should be gradually developed by which our surplus of farm products could be marketed at home, and only so fast as the demand calls for them at profitable prices. We do not care to be committed in favor of what is known as the sub-treasury scheme, neither as a means of putting money into circulation, nor as a means of withholding from an unprofitable market, surplus farm products till satisfactory prices can be obtained, but the scheme is not wholly without merit. Put in a nutshell the provisions of the bill prepared by the St. Louis convention of the Farmers' Alliance, held in 1889, are that the government shall warehouse non-perishable farm products, and upon this security shall loan to the producer or borrower (80) eighty per cent. of the market value of the goods, in legal tender money, at the nominal rate of one per cent. interest. To illustrate, A farmer has one thousand bushels of wheat which at current rates is worth one dollar per bushel, but he wishes to hold it for a higher price, and yet needs some ready money. He puts his wheat in a government warehouse and receives a certificate of deposit which itself is negotiable and also, eighty per cent. of the value of the wheat in cash. He can redeem the wheat at his pleasure on payment of the principal and interest, and such moderate incidental expenses as may be incurred in handling and caring for the wheat. If not redeemed within a specified time, provision is made for the sale of the wheat, and the reimbursement of the government. Some branches of the Farmers' Alliance have made this their pet measure, but it is hardly probable that they will be able to so commend it to congress as to secure its adoption at an early day. Bankers and moneyed men generally laugh at the scheme and pronounce it wild and visionary, and probably it is; and yet it might be somewhat difficult for these men to point out definitely wherein it differs in principle from, or is less worthy of respectful consideration, than the national banking system. This system permits associations of individuals who have their money invested in government bonds to deposit them with the government and receive, not eighty, but ninety per cent of their face value in currency, which they are permitted to use in the transaction of their business, and at the same time are permitted to draw the accumulations of interest upon their bonds instead of paying the government for the accommodation. The advocates of the sub-treasury scheme only ask for a loan of eighty per cent. upon the current value of their non-perishable products, and propose to pay moderately for the accommodation. Wherein is their scheme more inequitable than the national banking scheme?

We do not feel disposed to make hasty war upon the national banking system. We have not forgotten that when the system was established, it created a market for an immense quantity of our bonds, and at a time when the life of the nation depended somewhat upon the ability of the government to secure sufficient money to carry on the war: at a time, too, when the ultimate value of these bonds was exceedingly uncertain. Nor has it been forgotten that these banks have given to the country a bank currency absolutely safe in the hands

of the noteholder, current everywhere throughout the country, no matter whether issued in Maine or California, and as good when the bank issuing it has become hopelessly insolvent, as when in the full tide of prosperity. To attempt to break down a system such as this, even in full view of its objectionable features, without offering something better, would not be a wise proceeding to say the least.

But without further digression, we accept as a fact the statement that the price of wheat in Liverpool has much to do with the price of the same article in our American markets. How, then, is that price affected by the silver question? Since 1880 when India began to ship her surplus wheat, by way of the Suez Canal to European markets, she has been a sharp competitor for markets heretofore largely supplied by the United States.

By reason of the cheapness of farming land and labor in India, wages being a mere fraction of the cost of labor in this country, notwithstanding the long distance of shipment, India wheat has been laid down at Liverpool at such low price as to drive out large quantities of our wheat and thus reduce its price at home and abroad. It is furthermore known that ever since 1835, silver has been the only legal tender money in India. The standard coin is the rupee, containing a fixed amount of silver, one hundred and eighty grains, eleven-twelfths pure. With this coin wheat and other commodities are measured in that country. This being so it is not difficult to see that anything which affects the price of silver bullion, affects the value or purchasing power of the rupee, and through it the price of wheat, in India, in Liverpool, and in every market of the United States.

No one pretends to dispute or disguise the fact that the increased coinage of silver in this country, and especially upon the basis of the ratio between gold and silver, as fixed by the act of 1837 (about one to sixteen, or more accurately, 1 to 15.988) or the increased purchase of silver bullion by the government will increase the price of rupee bullion everywhere. This fact was made clearly manifest for some time subsequent to the passage of the act of July 14, 1890. Before the passage of that act silver bullion was worth in New York about ninety-four cents per ounce. After its passage the price advanced till at one time it reached one dollar and twenty-one cents per ounce. Considerable of this advance was evidently speculative, and the price has since materially fallen off. Those who watched the wheat market after the passage of the silver bill referred to, will remember that the price advanced rapidly for several months. Owing to other causes operating with the advance in silver, the advance in the price of wheat has since been better maintained than the advance in silver, but doubtless the increased value of the India rupee, following the advance in silver bullion, advanced the price of wheat in India, in Liverpool and in the United States. How far reaching in its effects an act of the American Congress may, indeed, become!

In all we have thus said concerning the free coinage of silver on a fair and equitable ratio as between gold and silver, we do not wish to be understood as offering any apology for the mere speculator in silver bullion. The friends of free coinage deprecate his manipulations, for the obvious reason that they tend to discredit the measure and render it more difficult for it to secure a fair hearing before congress and the people. But just as little do we feel disposed to condemn an act of congress because it may affect some interest in such manner as to enable speculators to turn a penny readily. To condemn all such acts

of congress without first taking into account their objects, general trend and probable effects, would be unwise, and to condemn much of our most valuable legislation. Probably every important act of congress touching our financial or economical affairs, has affected some interest in such manner as to enable the speculator to make more or less money. Pension agents here and there have grown rich through our pension legislation, notwithstanding all the precautions of congress calculated to protect the pensioner. Who will say that our country's brave defenders should receive no pensions because of the speculations of pension agents?

There is another matter which I am inclined to think is of great importance to the farming interests of our country, and that is the expension, not of our territory, but of our foreign trade. The fact is patent to all close observers of the statistics of our foreign commerce, that in some respects it is in a very unsatisfactory condition. The falling off in some directions is alarming, and our trade with the countries south of us has never been satisfactory. In 1889 our total exports of all kinds to all the countries of the three continents of Europe, Asia and Africa and Australia, Canada and the Sandwich Islands, amounted, in round numbers, to \$658,000,000 and our imports from the same countries amounted to \$529,000,000, thus showing a balance in our favor of \$129,000,000. But when our accounts with the rest of the world were all closed, instead of having \$129,000,000 to our credit we had \$13,000,000 against us, showing that we must have lost in our trade with the countries not enumerated about \$142,000,000. We lost \$41,000,000 with Cuba, \$51,000,000 with Brazil, and \$10,000,000 with Mexico. In short our imports from countries south of us, insular and continental, were, in round numbers, \$216,000,000, while our exports were but \$74,000,000. Is it any wonder that our Secretary of State is so earnestly at work trying to complete arrangements with these countries, which will result in increasing our export trade, to the end that our national ledger may annually show a more favorable state of accounts? And in view of the fact that in some of the countries our farm products have been practically excluded from their markets by excessive duties, is it any wonder that intelligent farmers in this country regard with so much interest, the efforts of our government to bring about reciprocal trade on such equitable basis as will result in opening up new and profitable markets for our farm products? Indeed it is greatly to be regretted that so many obstacles have been thrown in the way of this grand economic enterprise, some of which have evidently been born of a misconception of the importance of the movement, but others, and the more formidable, we fear, of the petty jealousies of public men who are slow to endorse anything which they may not have originated, or which might result of glorifying somebody else. Despite all this, however, reciprocal trade with foreign countries, wherever attainable upon satisfactory terms, is certain to become the fixed policy of this country. It is remarkable that people of this country, and especially farmers, have so long witnessed the curtailment of foreign markets for our surplus products, with apparent indifference. Look at some of the fruits of this indifference. In 1872 the tariff was taken off coffee imported to this country. This was a matter of immense benefit to Brazil, and congress had demanded from her concessions which would only have been equitable, with reference to our breadstuffs, leading articles of manufacture, etc. Had these been granted, the subsequent commerce between the two countries would have been mutually bene-

ficial to each. No concessions were demanded by this country, and what has been the result? Brazil placed an export duty upon coffee, about equal to the tariff removed by the United States, thus transferring the revenue realized upon that commodity from the United States treasury to that of Brazil, while our people continued to pay about the old prices for all they purchased from that country. Statistics show that since 1872 we have imported from Brazil, in round numbers, \$880,000,000 worth of her products and have only succeeded in selling to her about \$165,000,000 of our products, thus showing a balance against us of over \$700,000,000.

Fortunately for this country this unequal and unsatisfactory condition of trade between the United States and Brazil will continue no longer. An arrangement has just been completed between them, under the reciprocity provisions of our late tariff act, which will open Brazilian ports free after the first of April next, to many of our farm products and articles of manufacture, and will reduce her tariff twenty-five per cent. upon many others. And now the prospects are that like arrangements will be speedily completed with many other South American countries, and with Spain with reference to Cuba and Porto Rico, all of which will work immensely to the advantage of the American farmer and manufacturers. The countries from which we now receive coffee free, and from which, after the first of April, we will receive sugar, molasses and hides free, already see the importance of moving promptly in the way of removing the heavy duties which have so long almost practically excluded our farm products from their markets, and before the first of July, 1892, the time when the President is authorized to re-impose duties upon sugar, molasses, etc., imported from countries where satisfactory concessions have not been made to us, such concessions will, in all probability, have been made, and suitable arrangements concluded. The wisdom of this policy will be fully made manifest by its practical workings, and the farming interests of this country will be among the first to feel its beneficent effects.

Objection is made to this policy on the ground that it is limited in its scope. Enemies of our protective system ask, why not have absolute, instead of partial, free trade? We do not care to enter upon an elaborate discussion of this objection. Time will not permit and if it did, such discussion would hardly be profitable at this junction of our proceedings. In general, it may be answered that because the United States may make a favorable trade with one country to-day, touching certain of her products which we need or cannot profitably produce, we are under no obligations to make a bad trade with some other country to-morrow, touching some of her products which we do not need or can profitably produce. Nations stand upon no higher plan in matters of trade and commerce than do individuals. Because I may make a trade with a neighbor to-day which suits both of us, is no reason why I should make a trade to-morrow with another neighbor, which does not suit me, and possibly neither of us.

Others object to this policy for the reason that they deem it an important step in the direction of free trade, which they deprecate, and see in it a policy which will ultimately reduce our national revenues below the legitimate demands of the government, and at the same time seriously interfere with our home markets. We apprehend no such undesirable results. The reciprocity urged and that alone which should receive the sanction of our government, is upon the line of a

judicious protective policy. Under its operations our home markets will not be forgotten or injured. It is well understood by the advocates of reciprocal trade relations with foreign countries, that our domestic trade is probably ninety-five per cent. of our entire trade; corresponding with its paramount importance should be the efforts of our statesmen to encourage and wisely protect it. Neither is it forgotten that the prices, favorable or unfavorable, at which we can dispose of our surplus agricultural and manufactured products in foreign markets, has much to do with prices at home.

The outlook for the farming interests of this country are not wholly gloomy. Hopeful signs for the future are apparant. Not the least of these is the significant fact that farmers are awake and realize that something is wrong and that it is their legitimate business, if possible, to learn what it is, and apply the remedy. So far as the trouble is of a political character, they understand that in a government of the people, by the people and for the people, it is then right, in common with the representatives of other interests, to so direct their political influence as to correct as far as practicable the wrongs of which they complain. They cannot reasonably expect to secure all that the more sanguine and radical ask, and it is probably better they should not. The farmers' movement has as much to fear from the lead of impracticable demagogues as from the open opposition of adverse interest. Judiciously prosecuted, the farmer's reasonable demands will be heard in the near future and favorably answered, already much has been accomplished; a satisfactory revision of our state tax laws in the interests of justice and equity, is among the early probabilities. I am not prepared to believe the present legislature will adjourn without first making a fair, honest and equitable revision of these laws. I hesitate not to repeat the prediction heretofore made, that if by from any cause, chargeable alone to the legislative branch of our state government, these laws are not thus revised at the present session, the party now in power in that body will have no further opportunity to make such revision during the next decade and possibly for a much longer period in the future. Farmers and landowners of Pennsylvania have asked for bread and received a stone, as long as they propose to be thus banqueted. If the powers that be will not hear them, other powers will supplant them, who are willing to listen to their reasonable demand, and grant them the relief they deserve. Time will make all things right.

"As round and round we run,
Ever the right comes uppermost,
And ever is justice done."

Notwithstanding all the disadvantages and discouragements with which the American farmer may have to contend, there is no other country on the face of the earth where, all things considered, he could possibly better his condition. After all we have, indeed, a great country. From thirteen states at first we have grown to forty-four without dividing but one of the original number. We have a population of nearly sixty-three million. We have more English speaking people than all the balance of the world. The wealth of our country is sufficient to buy out Great Britain and Ireland, and pay off all their enormous public debt. Our internal commerce exceeds the foreign commerce of Great Britain, Ireland, France, Germany, Russia, Holland, Romania and Belgium combined. One railroad company in this country carries more tonnage than all the ships sailing under the

flag of Great Britain. We have over 150,000 miles of railroads and can travel, if we wish, 3,000 miles without change of cars. We have 770,000 miles of telegraph wires, sufficient to girdle the earth thirty times. Our soil in point of average natural productiveness, and our climate in point of variety, are excelled nowhere, and are the admiration of the world. Our common schools, colleges and universities are the pride of our people, and a sure guarantee of an educated posterity. Our churches, whose spires, in close proximity, point heavenward all over the land, constitute a moral and religious force which none but the infinite can measure.

ENSILAGE.

By J. H. DENHAM, *St. Clairsville, Ohio.*

(Read at Canonsburg Institute)

After five years of actual experience with ensilage, I am convinced that it is no longer an experiment, but it is a matter of study in the economical feeding of farm stock.

No one who has read carefully the agricultural journals of the day, unless he is intentionally prejudiced, can fail to be convinced of the fact that ensilage is one of the most economical, healthful and profitable foods known. Dairy cows, feeding cattle, and farm stock of all kinds, eat it greedily and thrive well upon it. Dairy cows will yield a heavy return. Beef cattle will take on fat very rapidly, and both butter and beef made by feeding ensilage are A1. in quality.

These are matters I need hardly spend time in discussing with an intelligent audience as this and it is no use for any one before me to deny what I say, as I can draw plenty of witnesses from this audience to prove what I have said are facts; and if there are any doubters in this audience I would invite them to my own or any other stable, during the coming winter, where ensilage is fed and they will be convinced.

The question is not, then, can green provender be kept for winter feeding? This has been proven beyond a doubt, but the question, how can it be raised the most economically, and kept with the least per cent. of loss?

The question of what to raise, is not, in our estimation, a difficult one to decide, that is, if taken from a profit standpoint; and we believe it is generally considered by those who have had experience, that corn is by far the best ensilage crop that can be raised. Our own experience has been confined to corn entirely, but the kind of corn to plant, how to plant and cultivate the crop, are questions for our study.

What we need is, first, a good rich soil, the richer the better, and to have it as thoroughly prepared as you would for field corn. The question of fertilizing the soil, plowing the ground at a certain season, do not properly belong here, but are important questions for consideration at proper times, and which we have not the time in this paper to give that consideration due them.

The soil having been properly prepared, we would drill in the corn in rows about three and one-half feet apart and the grains about six

inches apart in the rows; this is a little closer than we care to have the corn when grown, but in the cultivation some will be lost, and what is lost by other causes will leave the crop about right. Of late there have been several advocates of the planting-in-hills theory, and we are not sure but it may be proven that full as valuable a crop can be raised in the hills as in drills. There is one thing sure, and that is, that corn should not be planted so close that it will not properly ear, or make a full growth.

The amount of corn that can be grown per acre depends largely on the soil. From ten to twenty tons bring the usual crop, while several reports have come in of twenty-five tons and a few at as much as thirty tons. We never saw a crop we have thought would have averaged over twenty tons, and we are well satisfied with a fifteen-ton crop, and well may we be, for with a loss of three tons per acre we will have enough left to feed one cow for one full year, as I will hereafter show you.

In the cultivation of the crop, I would first harrow the corn with a Thomas smoothing harrow, or some light harrow; the teeth slope back; this will loosen the soil and injure but little of the crop. I have harrowed the second time with profit. The first harrowing should take place when the corn shows two to three inches above the ground, and the second as soon as the soil is dry enough after the first rain or within one week. Then follow this with a cultivator or plow as you usually do with your corn crop. All things being equal, the better the cultivation the better will be the crop.

The crop should be let stand until it is pretty thoroughly matured, that is, until some of the lower blades begin to die, and the husks begin to turn white. This will bring your crop up to the time for filling the silo and we will now turn our attention to the building of the silo.

I need not go into all the details in the building of a silo. The old theory that the silo must be made as a pit in the ground was exploded long ago, and the best silos in the United States are those built entirely of wood and above the ground. Any good strong building or part of building can be used, and it can be constructed in the barn bay if you desire, but I would prefer to have my silo separate from the barn and as close as possible to it.

The main points in building a silo are in thorough drainage at the bottom, so that no outside water can get into it, and thoroughly tight walls so that they will exclude the air.

If the silo is built upon level ground, the drainage can be easily accomplished by laying good sills directly on the ground and filling in the inside to the top of the sills with good yellow clay thoroughly packed. This, with a surface drain around the building, will insure perfect drainage, but if you are building on a hillside and have to wall upon the side next the hill the drainage is not so easily accomplished, and must be done according to the nature of the ground.

I would much rather build my wall upon the lower side of the hill and fill in and level up, than wall upon the upper side. My advice to every one building a silo is to look carefully to the drainage. The least surface water getting into the silo will injure the silage, and the only perfect floor in a silo, in my estimation, is a ground floor, or a floor made upon the ground.

In the making of the walls air-tight there are a number of different plans, all having strong claims in their favor.

One plan is to board up the inside with common rough boards and lath and plaster on these boards with water lime or cement.

I have no experience with this plan, but I have always been doubtful of its efficiency or durability. I have always felt that there was a liability to crack and so allow the air to reach the ensilage.

Some use two thicknesses of rough boards with tarred paper between, and I think that if two thicknesses of tarred paper were used and the boards were pretty well seasoned this would answer well, especially if a good coat of coal-tar was used on the inside layer. Another plan is to seal up with good hard pine flooring and then apply coal-tar, and many claim that this plan works well; but if I wanted to be sure of a good air-tight wall, I would first seal with good common well-seasoned barn siding, then two layers of tarred paper, one vertical and the other horizontal, and seal the inside with good, yellow pine flooring, well coated with coal-tar, to which was added five pounds of asphalt to the gallon and applied hot. This, in my estimation, makes a thorough air-tight wall, and one that will last for years. With drainage and walls as above, I feel sure that ensilage can be kept without a loss of more than from three to five per cent.

Now comes the point of filling the silo. This is an important point. The crop must be in proper condition, well matured, and cut when dry. I have cut the corn when dew or rain water stood upon it, and I know it is sometimes almost impossible to do otherwise, but I would in no case advise it. The corn should be thoroughly dry, and about as ripe as you would desire field corn, to place in shock. I have never tried anything on our rough hill land for cutting the corn that would equal cutting by hand. I have used a mowing machine some, but it would require about as much labor to pick up and pile the corn, as to cut it by hand. I would cut by hand and pile in bundles or bunches as large as a man can conveniently handle.

If your corn is convenient to the silo, I would haul on sleds; I think this less labor and faster than using the wagon. We place the corn lengthways of the sled, using standards four feet long, and can put one thousand pounds on a sled, a two-horse load, and when we drive in we take out the standards on the side next our cutter, and catching the other side of the sled we unload it very quickly, and in good shape. In this way we have, with two teams, hauled as fast as we could cut, or eight loads in one hour, or at the rate of four tons per hour. If I had to haul long distances, I would use some kind of a wagon, but I am not prepared to advise how to prepare your wagon. I would always use an engine for power to cut with; it is much more regular than horse power and much cheaper. We get an engine with a man to run it, for three dollars per day, and the engineer usually helps with the cutting.

In the filling of the silo care should be observed to keep the ensilage as level as possible, and to tread it well around the sides, and especially in the corners. I think this of very great importance; the center of the silo needs but little tramping, just enough to level it will answer. The great weight will settle it solid enough, but there will not be so much weight around the sides, and the friction against the walls makes it necessary to do a good deal of tramping. I therefore advise thorough tramping around the sides; and just here let me say that you will find it a little difficult to get your corn evenly mixed as it falls into the silo; the heavy portions will be thrown further from the end of the carrier, while the blades and lighter portions will drop down sooner, and unless great care is used in spreading you will not

have it well mixed, and so it will not settle regularly. When you begin filling your silo lose no time you can possibly help, until it is full and your corn all in, and then cover.

For a covering you can use cut straw, hay or sawdust. I have tried each of these and although I feel sure that sawdust will preserve the ensilage better than anything else I have used, I am not sure I would use it again, as it is more difficult to remove, and while I feel sure that it will exclude the air better than anything else I have used, I am not sure that that is all that is needed; for I am sure a light cover of hay will not exclude the air entirely, while some claim that they have had but little loss from this plan. I once used a cover of tarred paper with boards laid over the laps and had but little loss, but I have used cut straw and had good success, and again very poor success. Last fall I covered with straw nearly one foot thick, and lost five or six inches of ensilage. I think this is still a matter for study, and an exchange of experience would no doubt be of benefit to us all.

Now, if I have succeeded in convincing any one that the building and filling of a silo is a simple thing, the question will no doubt arise with many, what will a silo cost.

I would reply that a good silo that will hold one hundred tons can be built for one hundred dollars, and the lumber all purchased; but if you have the lumber of your own, you can build one for a good deal less. And as to raising the crop and filling the silo, the expense need not exceed seventy-five cents per ton. So any one can see that ensilage is a cheap feed.

My experience is that three tons of ensilage will feed as much as one ton of hay, and is a far better feed for milk cows or young cattle. I have fed it in small quantities to horses, sheep and swine, and also poultry, with good results, and I am satisfied that there is no other feed that so nearly fills the place of June grass as ensilage. My experience in feeding beef cattle leads me to believe that beef can be made with a profit at two to two and one-half cents per pound, and that the beef was first class.

HOW TO GET A BASKET OF EGGS IN JANUARY.

By JOHN D. HARP, *Millville, Pa.*

(Read at Millville Institute.)

First. Give the hens good warm and comfortable quarters.

Second. Give them a variety of food.

Third. If winter eggs are desired, it is necessary that hens should have, in addition to corn, some sort of small grain, as wheat, oats or buckwheat.

When only two meals a day is allowed, the small grain should be given in the morning, for soft food digests rapidly, and hunger follows soon afterward.

There is much in knowing the proportion and variety of food you should give your flock.

In attending to the needs of the poultry department on the farm, do not forget the fact that hens require exercise as well as animals.

This is especially true of laying hens; cooped in narrow quarters, particularly late in the season when the yard room is not available because of snow, they often become inactive, cease laying, and perhaps become sick, for no other reason than because they have nothing to keep their blood in circulation. Hang up a head of cabbage or a bunch of beets or carrots, or other roots, or a piece of meat, where they can pick at it. It must be just high enough so that a little jumping is necessary to secure the coveted bite. This allowance must not be calculated as a part of food, because the amount which each hen gets will be small.

Another good way to secure exercise is to litter the floor of the henery heavily with straw, and compel the hens to search vigorously in it for an early supper of whole grain. But the best way I have ever found on cold and stormy days to keep them exercising is to hang up sheaves of grain. If that wont make music, there is no music in them.

Perhaps no other farm product will give better results than sweet and sour milk. Thicken with shorts and meal. Nothing is better for moulting fowls or chicks than oats. It will form muscle, something needed during weakening process. Sulphur should be mixed with the soft food in the morning.

I think ground oats, meal or bran is the proper food at moulting season. Bear in mind that hens need drink in cold weather, and where water or milk cannot be kept by them all the time, it should be supplied twice a day, and it should be clean.

Besides the food and drink, the winter laying hens must have a supply of gravel and crushed oyster shells, or lime in some form. If you can give raw or crushed bone two or three times a week it will do more toward filling the egg basket than all the "patent egg food" ever manufactured.

THE PROFITS REALIZED FROM THE LIVE STOCK ON THE FARM.

By D. K. LAUBACH, *Fair Mount Springs, Pa.*

(Read at Millville, Pa.)

In order to realize a profit on live stock we wish to call attention to the following propositions; and we say that on them is based all the profits or loss involved in this subject:

First. The object for which stock is kept is to be well considered.

Second. The kind kept.

Third. The amount kept.

Fourth, and most important, how kept.

With regard to the first we say, every successful farmer should keep, yes, we will make it imperative, must keep, all the stock on his farm necessary to supply all the demands of his farm for such stock; that is, he must keep all the cows necessary to supply his table with milk and butter; cattle for his beef, hogs for his pork, sheep for his mutton, etc., and he who fails in this is not a "business man." You know our present secretary of agriculture said, "The successful farmer of to-day

must be a business man." He must keep all the horses, and, according to proposition second, of such kind to meet the demands of his business. If his soil is hard to break or he has heavy drafts to draw, his team must be heavy too; but if his farming is light, and he has long drives to make with light loads, then we think a small, or at least a medium-sized, team is preferable. By way of illustration allow me to relate the experience of a friend and neighbor of mine. He lived on a fifty-acre farm of loose soil and easily farmed; he was a wide-awake man, always had his work done in time and made it a point to go to Hazleton, a distance of thirty-two miles, once a month in busy times, and at other times every week, with a light load of ten, twelve, fifteen, eighteen, or perhaps twenty hundred pounds of eggs, butter, pork, beef or whatever he could find that would pay. He drove a pair of small horses, say nine hundred or nine hundred and fifty apiece; with these he did all his farming, and when the time came, trotted over the Union and Shickshinny, and the Berwick and Hazleton turnpikes and back again, and thus made these little horses serve him for ten or twelve years, when he thought a larger team and heavier loads would pay better, and he bought a team that weighed twenty-eight hundred or three thousand pounds and in less than one year killed both of them; then he bought a small team again which he drove as long as he lived. Now it does not take a philosopher of the Dr. Benjamin Franklin calibre to tell where he failed to realize a profit.

Under our first and second proposition, every wise American farmer, especially do we refer to those who live with Uncle Sam, must consider, first, the object for which he keeps stock; second, the kind. If he keeps cows to supply a creamery or if he wishes to make butter for sale, he must keep such as produce the most of that article. If for dairy or for sale to dairymen, then the quantity of milk is the object which demands the highest price.

With regard to horses; if they are raised for sale then the market must be consulted. To illustrate: a few years ago, when the Percheron was introduced, we did not fall in love with him as our neighbors did, so we raised a Morgan to suit our own fancy; the sequel proved that our wisdom was found wanting, for we had to sell our horse for one hundred and fifty dollars, while our neighbor sold his Percheron for two hundred or two hundred and fifty dollars. Then we tried the Percheron, and had no trouble to realize the highest price for our horse. Now, as before in the case of our friend, you can easily draw your own conclusions, as to the profit realized. We could draw similar conclusions as to sheep and hogs, but suffice it to say we consider the profits derived from them second to none on the farm. A friend visiting us a short time ago was admiring our sheep and asked, how much are they worth? We replied, eight, nine or ten dollars. "Oh!" said he, "I can buy all the sheep I want for two dollars and a-half and three dollars apiece." That is another question we remarked, and by way of explanation, replied, "the lambs will bring in market from four dollars and a-half to five and six dollars apiece, and the wool would be worth from one dollar and seventy-five cents to two dollars and a quarter a head. A year or two ago we had a ewe which raised twins for which we received nine dollars.

In relation to our second proposition, we say every farmer should keep the very best kind of stock of every kind, both for sale and for his own use, in order to realize the greatest profit.

Third. The amount of stock kept. There should be enough stock of various kinds kept on every farm to use up all the hay, straw and fodder, etc., that can be produced, in order that a plentiful supply of barn-yard manure may be had, and in this no small profits are realized. Now this brings us to our fourth proposition, and most important—how kept. It was our pleasure last summer to visit, as enumerator, every family in the township and inquire in their business and thus had a good chance to see how the stock was kept and to a certain extent to know how much profit was realized from it. No man deserves the name of farmer who attempts to keep more stock of any kind than he can feed and shelter well. How many times we heard the phrase "we had bad luck," while on our visits through the township. "Our lambs all froze, our pigs froze, the dogs killed our sheep, the cows fell on the ice." Why I say there was no bad luck about it, nothing but carelessness. Sheep, pigs and cattle allowed to run out and exposed to the winter's blast, is it any wonder the lambs and pigs froze and the cattle fell. One man actually told us that his old sow got so poor that he had to soak her in alum-water before she would hold swill, but we thought he exaggerated; but we really sometimes thought it would take two men to hold up a beef while the third could knock it down.

As to this bad luck we hear so much about, we would do well to remember what Dr. Franklin says, "We must be careful and oversee our own affairs with our own eyes and not trust too much to others." Again he says, "Want of care does us more harm than want of knowledge;" and again, "not to oversee workmen is to leave your purse open." "Trusting too much to the care of others has ruined many;" and again, "a little neglect may breed great mischief." Thus it is for want of a little care to have a pen for the pigs, a fold for the sheep and a shed for cattle, and then see that all was carefully housed and fed, that these slovenly farmers complain of bad luck, and murmur at a kind Providence for the unjust visitations of his benefits. But we are glad there is only a small portion of the mass so thriftless. Many keep fine stock and keep it well, which is seen at a glance by the thrift around, which tells plainly of the profits realized, as the Psalmist says in sacred writ, "their eyes stand out with fatness," and indeed if it had not been for the stock we cannot see how the people could have lived two years of almost entire failure of crops and the third not much better. We found some very careful to keep an account with their stock, even as to how much milk received and butter made, which enabled us very much to make out intelligent returns. One woman who kept account from two cows said, and had the figures to prove it, that after supplying the table for four children, herself and husband she sold four hundred and thirty-six pounds of butter. We were pleased very much when our attention was drawn to two fine specimen Jerseys as they stood on a bright June day in a pool of water under the broad spreading branches of a pine chewing their cud, on whose backs not a fly dared to alight, or if perchance one did, he quickly slid off in the water and thus filled a watery grave; and as we drove away we saw six fine Chester Whites lying in the shade of a chestnut, whose broad backs told plainer than words who drank the milk and realized the profits. Not far from this place, we found quite a different state of affairs; here we found four cows and the wonderful tale of bad luck was freely told. To the question, how much butter was made during the last year, "O, well, I hardly know; not very much; our cows didn't do well, one of them fell on the ice and is not over it yet." "Well, did you make two hundred

pounds?" "No; I don't think we made half of that." "Well, how much did you sell?" O, "we didn't sell a pound, we had to buy."

Now notice there were six in family. Had bad luck with the sheep, more than half the lambs froze, the dogs had done their share to the sheep, the pigs did not do well, they had lain in the manure and got to sweating, etc. And thus did we hear nothing but a tale of woe from beginning to end, and as we looked around we did not wonder at what we heard, for we did not see a pen or a hovel of any kind. An open yard fenced off with rails on the north side of the barn was the only protection and this was home for cows, sheep, hogs, and all the various kinds of stock. As we drove away we saw a half dozen cattle in a field, and although the weather was hot, some of them wore their winter coats yet, and an old brood sow that looked as if she was brooding over the fact that Satan was once permitted to enter her race, while half a dozen of her offspring with their long noses were reaching through the fence and taking out the second and third rows of potatoes, while many more were in the patch standing on their noses examining the roots to see if the potatoes were setting all right. These were all pure specimens of the turn bristle, that is, bristles all turned toward the head.

From these quotations you must draw your own conclusions as to the profits realized from the live stock. And now, fellow-farmers, if you wish to realize a profit on your live stock, first, consider the object for which you are going to keep the stock. Second, keep the very best kind for that object. Third, do not keep more than you can keep well. Fourth, give them the proper care and attention by your own supervision, giving them good and comfortable shelter from the storm and wintry blast; remembering, as we said before, a little neglect may breed great mischief. As Franklin said: "For want of a nail the shoe was lost; for want of a horse the rider was lost, being overtaken and slain by his enemy. All for want and care of a horse-shoe nail."

THE FARMER'S HERITAGE.

By F. M. EVES, *Millville, Pa.*

(Read at Millville Farmers' Institute.)

We have been confronted again and again by complex questions as we have looked over this large and intelligent audience that has convened here from the opening of this series of meetings with an ardor and unabated interest worthy this calling, and responsive to the call of our member of the State Board of Agriculture.

What means this movement, sustained and endorsed by our great commonwealth; of affording the humblest husbandman the privilege of lectures and discussions free upon subjects pertinent to their respective localities, and thus foster an especial pride in his calling, and develop a latent love that lies very near the heart of every man and woman for rural occupations?

We admit that all Pennsylvania farmers need to be educated as thoroughly as men in other professions, for the mind has more to do

with successful farming than the muscle, and the broader the education, the better the chance for signal success. The more abundant the reward for their toil, the more fully will they anticipate their future blessings.

What is the significance of the Farmers' Alliance, including the National Grange, Farmers' League, National Colored Farmers' Alliance, Patrons of Husbandry, and other organizations, that have spread as a tidal wave over the south, west, and great northwest, that reckon their hosts by millions.

At first they claimed they were benevolent, social, and coöperative alliances, working out purely social, educational and economical problems. But later developments showed that they had banded together to effect political reforms, in which they were particularly interested. But reforms were so necessary they were welcome from any quarter.

Did it mean that the intelligent farmers who form the solid basis of our republic were devoting their energies to their farms and dignifying their employment to the exclusion of other duties?

It was a little late in the nineteenth century that they discovered their heritage slipping away from them. That over twenty-one millions of acres of the best lands in this country that should have been an inheritance to your posterity are owned by men or companies who owe allegiance to governments of Europe.

Instead of a solidly virtuous, trustworthy and useful people that we love to recall in the yeomanry of our ancestors, you were becoming the dupes of demagogues and wily politicians whose promises of doing something for the poor distressed farmer were made to the ear and broken to the heart. And you ignored your civil duties when you knew they involved protection in person and property, nationality and human rights; and for want of your healthful influence in enforcing our local laws our country is almost submerged with intemperance and its attending train of evils, ignorance, poverty and degradation, tempting your sons and daughters on the right and the left, and luring them away from pleasant country homes by the false glitter of city life and the unequal chances of competition, their honest ventures too often ending in failure and humiliation.

It is a startling fact shown by statistics that seven-tenths of the degraded in our large cities came from respectable country homes.

With the dawning of this new era the farmers have conclusively a capacity for doing something for themselves. They have united in such vast numbers they can demand reforms instead of petitioning for them.

The keynote of this hopeful present and future was touched by R. G. Horr in a recent article in the *New York Tribune*. He says, "if farmers will depend on their own industry and skill for the production of wealth, and keep clear of visionary schemers who claim that there is a way to make every one well off by simply passing statutes, this country will soon be the best land for the tiller of the soil on this green earth."

Will the farmers of Columbia county do this? Our country is rich in all that nature gives to make the earth beautiful. Grand old forest trees, upland vales and glens, and rich in mineral resources.

The discouragements you meet are incident to all professions. From observations made at life's noon-tide, we can say that our farmers to-day are the best fed, have the best homes and are the best looking people in our community. A glance over this sea of faces will bear me out in this statement.

And here are your sons, restless and enterprising young men, (after we have humanely provided for our Indian wards and restored to them at least a partial evidence of good faith in the treaties made by our government); there are yet millions of acres rich in all of the elements of fertility inviting you to break away from early associations and make new homes in the west. Uncounted valleys in the mountain ranges that border the Pacific coast are waiting the foot of the settlers to develop all of the industries of agricultural life.

And these young women quietly and wisely working out life's problems in your secluded homes. With what words of cheer shall we greet you to-day.

If you fill your days with industries and your years with records of useful deeds, your lives will become volumes of noble toil. God did not make a mistake in setting us to earn our bread by the sweat of our brow. He made every human being to be practically useful in their day and generation, and whoever seeks to be a mere ornament or parasite encumbers the state.

Our social discords can never come into harmony until every man and woman performs a fair share of the labor of the world and glories in doing it.

Indolence is a bad symptom for the moral health of our people and the permanence of the republic.

In our final appeal to the farmers of Columbia county, although many of you are called to earn your crown in obscurity and silence, and toil for a heritage to bequeath to your children, remember that better than houses and lands, stocks and bonds, is an example worthy to be emulated, a character above reproach and an evidence that you have exercised a good influence upon the thoughts of the world. That they may walk in the path of right, truth, of justice and love, and be enabled to live out their noblest attributes and harmonize with the purposes of the Creator.

MAKING AND FEEDING ENSILAGE.

By M. G. BROSIUS, *Chatham, Pa.*

(Read at Unionville Institute.)

I am under the impression that the subject selected for me to talk about to-day is not interesting to many of my hearers, but as I believe the subject is rapidly taking its place among the more important interests of the farmer, who has taken the business of feeding stock for his profits, I am content with the feeling that some may be benefited by my effort. When we consider that ten years ago the silo was almost unknown in the United States, and to-day they are numbered by thousands, there is ample proof that it is worthy of investigation. When we take into consideration the fact, that there has scarcely any new thing come before the public, the hostility to which has been so great and criticism so severe, the silo is making its appearance in new places, and it must have merits.

When the making of ensilage was first introduced it was supposed to be the siloing of what is known as soiling or fodder corn, or corn

sown too thickly to produce ears, and although that was a great step in the economy of feed, it has been superseded by the generally adopted practice of using the full crop of well-matured corn. I have been feeding ensilage for three winters with a great deal of satisfaction. Stock will eat good ensilage in preference to good hay or corn fodder, and will eat partially spoiled ensilage as well as partly spoiled hay or fodder. We have had the milk tested with and without ensilage, resulting in favor of ensilage of one and one-tenth per cent. of butter fat which is equivalent to a gain of one-fifth. There is also some gain in quantity. We think we are justified in making the following assertions: That there is no risk in storing away corn ears and fodder together if the silo is properly built and the crop put in with care. That it is no more work or expense to silo corn than to harvest it in the usual way, and much less labor in feeding it. That unless it can be proven that the full ripening of the corn, taking the grain and fodder combined, adds to its value as food, there is a gain of one-fourth on all corn siloed, as it costs about one-eighth to husk it, and one-eighth to grind it, the cutting and hauling being the same in both methods, not counting the expense of hauling it to the mill through mud and over frost. That if it is desirable that the cow should have mixed feed in order to have the same pass into all the stomachs of the animal, we have it at once by putting the meal or bran upon the wet ensilage, and also have a warm and partially cooked feed as food, kept at a temperature of 140° for a month or six weeks, must in some degree be cooked; that stock fed largely upon ensilage will drink but little water, which is desirable by those having cold water for their stock. The danger of over-feeding so much to be dreaded by the heavy feeder, is in a great degree avoided, as a surfeit only lasts a short time. That cows fed with ensilage will give more and better milk than with the same cost of other kind of feed, provided there is proper care taken to keep the cows in warm stables during very cold weather; as it is only reasonable to suppose that if fed on green summer feed, which we claim ensilage to be, that they cannot so well withstand the severe cold of winter. With these conclusions granted, next comes the question how to make good ensilage; how to build a silo that a good article may be assured. It is unreasonable to suppose that a silo can be built that will secure every particle of its contents. The curing of green crops depends upon the proper attention being given to all the principles involved. In building a silo the first consideration is its location. It is very important to have the bottom on or near a level with the entry floor, as the taking out is done by manual labor, the filling with horse or other power, and with a carrier attached to the cutter, the corn can be elevated as desired. Most situations will admit of both filling and emptying on or near the level. As to the shape we prefer the rectangular with the entrance at one end, so that the feeding which should be done from the bottom of the silo would not necessitate the exposing of any more ensilage than is necessary, as it soon spoils when exposed to the air. We think with a stock of twenty cows, the silo should be about ten feet wide, twelve feet deep and length according to the amount of corn you wish to cure. These dimensions thirty feet in length will hold about five acres of corn, that would make fifty bushels per acre; with these dimensions there would be enough taken out at one time to prevent any part of the surface remaining undisturbed long enough to damage.

The material of which to build, and whether above or below ground,

has been very much discussed in agricultural papers. I think it would be very unwise for any one to build a silo without seeing one that was known to be a success. The last account I read was that any silo that would hold water would keep ensilage. This was on the supposition that to be air-tight was all that was necessary. This is undoubtedly a mistake; if we were to build a glass, air-tight silo on top of the ground and fill it with green corn it would be no more likely to keep than if a woman would fill a glass jar with cold tomatoes, seal it up and set it away for future use.

In our opinion it makes no difference where the silo is built; or what material is used, if it is properly protected and surrounded by a non-conductor to such an extent that its inclination to heat, which is about 140° , will not be in any way retarded. If this protection is not furnished by the builder it will furnish its own by several inches of the outside rotting, the remainder will be likely to cure in some degree.

We are convinced that in the heating lies the whole secret, that it is the heat that expels the air. Making ensilage is simply canning green crops, and the success depends upon the ability of the operator, to comply with the requirements necessary. Now if it is the heat that expels the air is it not evident that the outside being placed next the cold material of which the silo is built, will fail to heat up to the required degree and the consequence will follow. It is also evident, and experience proves, that we cannot make ensilage in a square corner because there is not sufficient corn in the sharp angle to admit of its properly heating, therefore the corners should either be rounded or boarded across, with the space thus cut off filled with a non-conductor. If the silo is built in the ground a stone or brick wall lined with boards, jointed tight, has been found to answer well. If built above ground, two thickness of boards with tarred paper between has also been found to answer. Next comes the covering which is the last operation and one of great interest at the present time, as it is much disputed whether or not the weight can be dispensed with; our experience is such that requires us to say that with the deep narrow silo, that is intended to be fed from the top, weight does not seem necessary, but with the horizontal recommended in this article, considerable weight cannot be dispensed with. In regard to filling the silo, our experience is that the corn should not be put in wet, should be cut as short as circumstances will permit and that continuous filling is not necessary: a delay of thirty-six or forty-eight hours will do no harm, but a much longer time will result in injury, as the heat and moisture rapidly coming to the top and coming in contact with the air, will mould the upper portion of the green corn, and once damaged in this way, its good quality cannot be restored, but will have no bad effect upon the curing of any corn in after filling. There is much difference of opinion in regard to the time to cut the corn, the latest writers claiming that it should be well matured, almost ripe. We fear great danger in this respect: while we think that it should be well matured, it is an easy matter to go too far, as it is necessary that it should return to the succulent state, and if too ripe it will fail to do so, and the liability of being detained by bad weather makes it very risky to postpone the cutting this long. In conclusion I want to say that while I am well aware that a very large portion of my hearers will never build a silo, I am confident that the time is not far distant when it will no longer be looked upon with doubt and fear, but will be hailed with joy by the young man who

has chosen the cultivation of the soil for the medium by which to obtain an independence. It becomes us, as farmers, to be ready and willing to accept any opportunity to advance our interests and make our profession more pleasing and profitable.

SUCCESS IN CATTLE FEEDING.

By FOREST PRESTON, *Spruce Grove, Pa.*

(Read at Oxford Institute.)

Success in cattle feeding is the subject that has been assigned me for your consideration this morning. Probably nine-tenths of the cattle feeders of eastern Pennsylvania if asked to-day whether cattle feeding is profitable, will answer that it is not. Let us examine this question closely, and see what are some of the causes that have brought this result about, and whether there is any remedy for it.

No doubt the principal cause for the low price of beef to-day, is the fact that the great West, with its cheap lands, and good facilities for cheap and rapid transportation to the east, is the most important factor in the case.

Both live cattle, as well as dressed beef from the immense slaughtering houses of Chicago and Kansas City, are laid down in our eastern markets at prices that fairly paralyze the eastern feeder of cattle. Probably not one feeder in a hundred can tell you exactly what he has made or what he has lost in feeding a lot of cattle.

This is principally owing to the fact that most of us follow a mixed order of farming and feeding, so that cattle and horses, and often sheep and swine, are fed from the same bin and mow. Consequently we cannot tell how the account stands. If cattle are bought at four cents in the fall, and well fed all winter, and sold for four cents in the spring the majority of feeders will tell you that they have lost money and without doubt they have; for the gain in weight is insufficient to pay for the provender consumed and labor bestowed upon them.

The farmer of to-day in order to be successful in feeding cattle must consider three points. First, buying; second, feeding, and, lastly, selling. Let us consider these points separately. First, as to buying. Let the prospective buyer consider first what kind of cattle his market demands. When he goes into the market to purchase stock cattle, he has three grades to select from. First, the extra fine and heavy ones; second, the grade known as "good common," and, third, the scrub. Now which ever one of these classes sells the best in his market, when fattened, let him select from.

It, may be added here that it has been the experience of most feeders that there is more profit in the second grade than either of the others. Recent experiments have shown that the average gain of yearlings was about two pounds per day, of two years old about one and three-fourth, while the three year olds gained about one and one-half pounds. As the yearlings are not what butchers desire we must necessarily take our choice between the two and three years old.

As the gain is more rapid in the two years old, we will select these for our purpose. As to time of buying let him purchase whenever they

are offered at fair rates, avoiding the months during which Texas or splenic fever is prevalent.

In feeding let the feeds be at regular intervals, whether they are fed twice, three or even five times a day, as some of our most successful feeders do. Let them be watered in the same way, and always in the barn yard and not at a stream one-fourth mile away. If possible avoid giving them ice cold water to drink. With plenty of good clover hay, bright and clean corn fodder and corn meal as essentials, cattle that are handled properly must put on weight rapidly. See to it that they are never over fed as this is worse than to under feed. Above all handle them gently and quietly.

Not since 1882, has there been much, if indeed anything made by selling cattle in the Philadelphia or New York markets.

In every neighborhood there is some kind of a home market. Let cattle feeders see to it that this market is encouraged and supplied, and each succeeding year it will demand more and more. The Americans, like their English ancestors, are a beef-eating nation and each year demands more beef than the preceding one. As an instance of this the town of Oxford, fifteen years ago, had but one butcher shop and had you gone there at that time and offered them a stable of fat cattle they would have looked at you in blank amazement. It was their practice to buy a chance heifer or cow. Sometimes perhaps a steer.

During the past summer three first class butcher shops have supplied the town and country around with beef and other meats. Probably fifteen or twenty head of cattle were slaughtered every week during the summer months, besides sheep, lambs, hogs and calves. These butchers have paid about Philadelphia prices for such as they could get that suited them.

In addition to the home raised beef, several car loads of western heifers have been slaughtered.

As to time of selling the old maxim applies to cattle as well as other produce.

When first the market offers well,
At once your yearly produce sell.
A larger price you wait in vain,
And nine times lose when once you gain.

Aim to make your cattle so good that instead of dressing fifty or fifty-six pounds per hundred weight, they will dress sixty or above.

One of our most successful cattle feeders in the lower end of the county has his cattle sold for future delivery at something over one cent advance. The butcher says his cattle dress sixty pounds per hundred, hence each succeeding year this man's cattle are bought up at good prices. Another farmer who has kept a record of his sales informs me that for the past ten years he has sold his cattle at an advance of from one-half cent to one and one-half cents, probably averaging a little over one cent. Most of these sales were to the home market. By way of encouraging the home market let farmers buy liberally of fresh beef and consume less of salt pork.

Few farmers realize the great difference between selling at a cent advance on three cents and the same advance on six cents. If the feeder is sure of an advance per pound, it is much better that he should buy at a high figure than a low one. As an illustration, a steer bought at three cents gains, say, four hundred pounds, these four hundred pounds are sold for sixteen dollars while the same steer bought at six

cents, gains the same weight, and this weight is sold for twenty-eight dollars, almost double the profit of the first.

During the past few years we have been afflicted with a new pest in the shape of the Texas fly. It makes its appearance as early as the twentieth of May and stays until frost. During this time cattle will not thrive but will positively lose flesh. Until some sure and efficient remedy is found for this pest, we would recommend that, if possible, the cattle be disposed of prior to the first of June.

The cattle market like every other one, will sometimes run to extremes. Let us hope that the lowest extreme has now been reached.

Already we see signs of the great cattle ranches of the west disintegrating. And when the syndicates that control them give up or are crowded out by the influx of settlers, then a brighter day will dawn for the eastern feeder of cattle.

In conclusion, let the feeder remember to purchase his cattle at the right time and the right prices. To feed them judiciously, and lastly, to sell them whenever he is offered a good advance and for cash.

THE UPS AND DOWNS OF THE POULTRY BUSINESS.

By WM. T. CREASY, *Catawissa, Pa.*

(Read at Benton Institute.)

Success and failure in the poultry business are two very different results; one of which every poultryman gets as a reward.

In this paper I will only discuss it as an adjunct business.

In recent years a great deal has been written and published; poultry journals have multiplied wonderfully, and if everything we read was true we could get at no better paying business. But outside of this poultry farming on paper, there are some such obstructions marked failure; and to make money with poultry is not so easily accomplished as some may imagine. Yet poultry can be made to pay on a farm under proper management.

I will give you several poultry accounts; the first one my own, and the only one I ever kept, though it was not every year as good.

Number of hens kept, 48.

Value of eggs gathered during year	\$103 44
Poultry sold during year	37 57

Making a total of	<u>\$141 01</u>
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This netted me about one hundred dollars.

The chickens we ate, the hen manure, and the work are not counted in the above account nor in the following ones.

A friend of mine who has kept an exact account of his poultry for a number of years has furnished me with his best and poorest accounts, which I will give as taken from his books:

Average number of hens during year, 38.

Number eggs gathered during year, 461½ dozen.

Value of eggs gathered during year	\$97 28
Poultry sold during year	52 65
Making a total	<u>\$149 93</u>
Cost of feed	48 86
Leaving a balance of	<u>\$101 07</u>
The cost per hen was	\$1 30
The number eggs laid per hen was	175
Profit per hen was	<u>\$2 64</u>

His poorest account is as follows:

Number of hens kept during year, 40.

Eggs gathered, 393½ dozen.

Value of eggs	\$65 92
Chickens sold	36 11

\$102 03

Value of feed	49 10
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Balance	<u>\$52 93</u>
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Eggs laid per hen	118
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Profit per hen	\$1 32
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Cost per hen	<u>1 23</u>
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The average profit per hen would be nearly two dollars in a flock of about forty hens.

These results were accomplished with a comfortable hen house and good care. The feed was mostly corn, wheat, buckwheat and milk and bran mixed. The chickens had access to ground oyster shells and an occasional treat of raw bone cracked.

But remember if one hen produces a profit of two dollars, it does not follow that five hundred hens will produce five hundred times two dollars, or one thousand dollars, for the same rule does not apply to hen culture, for the reason that as the number of fowls is increased the care is also increased in a geometrical ratio; double the number of hens will require about four times the care to produce the same profit.

By practical experience I find that a flock of fifty hens left run at large on a farm will thrive better and cost less and give a larger income than the same number enclosed on a half-acre lot. But where a person does nothing else but tend poultry, and on a large scale, the reverse may be true.

Ducks, geese, turkeys, guineas and pigeons are profitable where one takes a delight in raising either of them, but without taking a pride in the work it will be a failure. Gentleness and patience are two great virtues in the poultry yard as well as anywhere else. A rough master has shy poultry and as a rule the profits on the wrong side of the ledger.

The value of the products of the poultry yard exceed the value of the products of the iron manufacturers, and besides this we import annually several million dollars worth of eggs; all of these could and should be produced at home. But in trying to accomplish this and

make the poultry business pay we meet the other side of the subject—failure.

I gave you several accounts where the enterprise was reasonably successful. Now I will give you several which are types of those that are on the road to failure. A certain person read a great deal about the profits of the poultry business and commenced to figure if one hen yields a profit of three dollars, four hundred hens will give twelve hundred dollars. And the more he read and figured the worse he got the hen fever, until finally, without any experience but his paper knowledge, he made a start. The scene was on a thirty-five acre lot near Norristown, a few years ago; invested one thousand dollars as follows: Four hundred dollars in a fine poultry house with nicely divided yards, etc.: two thermo-static incubators at a cost of two hundred and fifty dollars; the balance, three hundred and fifty dollars, in poultry, eggs, brooders, etc. He commenced to hatch chicks by the hundreds, and in a few weeks they commenced to die by the hundreds. He continued the business one year with an additional five hundred dollars invested, and then stopped with a loss of fifteen hundred dollars, but a vast amount of experience. He is satisfied there is money in it because he lost some there.

Another man bought about one thousand hens, put all in one flock, and commenced counting profits, but before he had rightly decided the case the cholera came along and closed out the business. These are examples of a large class of which no records are published.

There are other troubles on the road to success; hawks, cats, rats, crows and lice, and among diseases, gapes, cholera and roup.

Hawks and crows get about two per cent. of the chicks hatched as they are generally cared for on the farm.

Even with the best care they get a good share of them. In one summer I lost one hundred and fifty chicks out of two hundred and seventy-five by hawks, and they did it so nicely that I only saw them take two of them. There is no let up to them if they can find them out. The best remedy is to shoot them or raise your chicks in an enclosure until the grass is high enough for a protection. In this enclosure we put brush so as to shield the chicks from the hawks when they dart for them.

Cats do much damage in a poultry yard. We had thirty chicks and a cat caught fifteen before I missed any, and on the same day she caught six more, yet she seemed so innocent that we could not believe that she did the mischief until she was caught at the act. We then applied the shot-gun remedy.

Cleanliness will prevent lice. White-wash your poultry house occasionally, use coal-oil on the poles once every two weeks, set hens only in clean new nests, coal-oil the boxes before setting, and sprinkle sulphur on the hay or straw. If a hen breaks any eggs while setting take milkwarm water and wash the nest; lice breed fast in a filthy nest. When the chicks are hatched grease them with a little lard under the wings and on the head. Keep hen coops cleaned.

The three diseases, gapes, cholera and roup are not the only diseases which one meets in the poultry yard, but they are the most formidable ones. Gapes, though never troubled with them, I think is the worst one. There are different theories in regard to the cause of gapes. It is a worm in the windpipe as you all know, and when too many get there the chicken chokes to death. I think it is bred during one of its stages in the ground and requires warmth and moisture. To prevent it is the

main object. If my chicks were troubled with it, I would select a dry place on a little hill or knoll and be very careful about watering them, so that the ground outside of the vessel containing the water would not get wet; probably the best plan would be to remove some of the soil and fill up with small stone and gravel, so that all water would soak away. This is only a little thing, but where the worms are, water and sunshine on the ground breed enough worms in a short time to kill all the chicks in a state. Feed no sloppy food.

If this would not work, I would try putting them on a floor; but be sure to keep everything clean and change your place of raising chicks every year. Cholera, I think, is next to gapes; this seems to make its appearance as an epidemic between every seven and fifteen years. I cannot assign any particular cause nor any remedy. July and August, hot and dry weather seem most favorable to it. As a preventive I would recommend keeping clean water before them.

When it appears as an epidemic there is no time to doctor. High-fed chickens and those kept in over-crowded houses, as well as those in an unhealthy condition, are generally the first to be affected.

The only plan is to separate the healthy from the unhealthy ones. In its milder forms I have known cases where it was cured.

Roup is next in order, and is also a contagious disease. I have never considered it a very fatal disease, but in some localities it is worse than others. Its is a cold in the head—a kind of nasal catarrh. The causes are over-crowded poultry houses, wet and cold, and keeping poultry houses open some nights and then close them other nights, causing an unusual perspiration, which causes the hens to get damp and take cold. I would recommend a laxative diet and good nursing.

These are the principal causes of failure in the poultry business where care is given, and one must expect to meet them and sometimes it may cost every chicken on the farm. But don't lose your courage.

There are several other important points in raising poultry; one wants to be posted in the egg market. Gather your eggs every day, fresh and clean, and sell where they bring the most money. Of course where one lives near a large city, you can deliver the eggs to the customers yourself and get a fancy price, but we are not so situated. But remember, fancy prices are only obtained for first-class articles in any business. Sell your poultry where it brings the most money and when there is a demand.

We generally raise a lot of early chicks hatched in March and April which will lay in the fall and during the winter. The old hens we sell during the summer and early fall when they bring a good price. In the fall or early winter, weed out your stock; sell balance of old hens, unless extra layers, and all scrubby stock; keep your early pullets if you want eggs when they command a good price. By this sorting process you can in a few years have a fine stock of poultry.

Keep good stock, as it costs no more feed than poor stock, and I would recommend thoroughbred. I think a thoroughbred fowl will give as good a return as the mixtures will and they are certainly more beautiful.

Use poultry and eggs yourself; don't feed your family altogether on pork.

Encourage your children to raise poultry, even if they can't do it as well as yourself; help them to learn.

Do not go into the poultry business recklessly, but commence gradually and learn to make a small flock pay.

Build yourself a comfortable hen house if you have not one already. Finally, do not starve your poultry nor feed them to death, but use a variety of healthy food. Study your business, stick to it and apply good common sense.

CLOVER AS A FERTILIZER.

By HENRY OMWAKE, *Greencastle, Pa.*

(Read at Greencastle Institute.)

Almost any soil contains a large amount of the elements of fertility, both mineral and organic, but only a very small quantity is available at any one time. Plants take up food only when it becomes dissolved in water. Therefore, whilst it is difficult to exhaust the soil of all the elements of fertility, it is not difficult to exhaust it of the soluble portion which is in condition to nourish the plant. Heat, moisture and thorough tillage hasten the dissolution of inert plant-food in the soil, but besides the aid of these natural agents supported by the industry of the farmer, in making fertility available, we have also a choice of crops which we can make use of with good effect upon the land in developing portions of the inert plant-food, so as to make it soluble that plants may feed upon it and make a vigorous growth.

There are several species of plants that possess the property of assimilating and storing in their tissues nutriment in available form for the wheat and corn that are to follow in the rotation, but the most useful of them all is clover; the common red clover which emits such a sweet odor when in bloom, and which for ages has occupied the front rank among the cultivated grasses, not only as a most nutritious cattle-food, but also as a fertilizing agent. Upon its introduction into England and Germany it is said agriculture was completely revolutionized, whilst in Holland it has been a factor in successful farming ever since its introduction into that country. Above all other means it is relied upon as a successful renovator of worn-out lands. Nearly a hundred years ago it was introduced into this valley by bringing seed from the eastern counties of the state, and the seemingly magical effect of its use upon exhausted soils so gained for it the appellation of "the farmer's friend," a title which it has well sustained during fourscore years of use. For feeding purposes it has no superior among cultivated grasses, and in its value as an adjunct to the manure heap it stands second only to oil cake. That it is a fertilizer, and that it enriches the soil by preparing it for the production of better crops is a well established and generally accepted fact. And though not doubted by the more experienced in the profession, that clover is at the bottom of successful farming in this valley, it is yet evident, from the number of bare fields to be seen every summer without a crop of any kind, that its agricultural value is but poorly appreciated by many, who are every year compelled to lay out their hard-earned cash for nitrogen at seventeen cents a pound, which they apply in the stinted quantity of five or six pounds to the acre, when, by growing clover, they might, without cost, and often at a profit produce from a single acre one hundred and twenty pounds of nitrogen, or as much as is contained in two tons of the ordinary ammoniated fertilizer.

The chief element of value in our barn-yard product is nitrogen. Hence, a noted chemist, when asked "in what way can nitrogen be most cheaply supplied?" answered "in no way better than by growing clover;" not only because of the great amount of nitrogen it gathers in its tissues, but also because of the increase of nitrogen it effects in the soil, thus leaving the land richer in plant-food than before it was grown. This statement, though seeming a paradox, is well confirmed by standard chemical authority; and it has been found upon analysis that a ton of dried clover, hay, contains forty pounds of nitrogen, and two tons, the usual crop, with another ton of seed-clover, would contain one hundred and twenty pounds, or about four times as much as is contained in twenty-five bushels of wheat, whilst sixty-pounds found in the roots and stubs is equal to the amounts of nitrogen in a ton of so-called high-grade phosphate. Thus after cutting from one acre the substance embodying one hundred and twenty pounds of nitrogen with the soil enriched to support a vigorous growth of corn, the question may well be asked, "where does the clover get this nitrogen?"

Professor Jordan says clover adds nothing to the soil, except the carbon taken from the atmosphere; yet when he says an acre of land, in order to produce twenty-five bushels of wheat containing thirty-one pounds of nitrogen, must contain much more of that element than is necessary to produce three tons of clover containing one hundred and twenty pounds with sixty pounds additional embodied in the roots and stuff left on the ground, followed with the remark that clover can gather nitrogen more easily than wheat, it shows that his mind is not too clear about the matter. Professor Wilcox, a prominent mineralogist, remarks that clover can obtain its nitrogen from the air, and gives in support of the statement, that he has seen it grow vigorously on a dump-heap of feldspar hauled from the mine in which there could have been very little or no nitrogen. Lately, Wilfarth and Atwater, have taken soil entirely divested of every trace of nitrogen and by watering, clover growing in such soil with water containing a slight trace of ammonia, the drooping clover revived and began to grow, and continued to grow, without any further addition of nitrogen in any form, while other species of plants would not grow after the slight supply of ammonia was exhausted, but languished and died. The clover alone survived, and upon analysis was found to contain nitrogen largely in excess of the quantity contained in the watering.

Nitrogen is not found as an ingredient of any of the solid rocks which constitute the crust of the earth; its natural home is the atmosphere, and though found in all plants, we must not forget that the atmosphere is its original source. When we burn up any organic substance, as hay or corn, the nitrogen contained in it is liberated and goes into the air. In this way, by decomposition and combustion, tons of it are liberated from the surface of the earth every day; hence the query, "how is the stock kept up if nature does not provide a way for its restoration to the soil?" The annual burning of our western prairies by the Indians, by which all the nitrogen contained in the enormous growth of grass was sent up in the air, presents the question for investigation; for only the mineral elements of plant-food would remain on the ground in the form of ash, whilst from every acre from fifty to seventy pounds of nitrogen would be liberated, yet with all this wholesale robbing of the soil of its nitrogen; the prairie is found to be richer than the timbered portions which have not been thus treated. Professor Frear,

of Pennsylvania State College, says, "though clover contains much more nitrogen, phosphoric acid and potash than timothy, yet it leaves the surface soil much richer in these elements of plant-food." Henry Stewart, another prominent agricultural author, after speaking of the fertile elements contained in clover, says, "there is reason for believing that a part of its nitrogen is drawn from the air and the remainder from the soil," and says further, "clover feeds upon the nitrogen in organic matter which is not available for other crops. Whether or not we accept the statement that clover assimilates any of its nitrogen from the air we are assured that it gathers it in larger quantity than the three crops, corn, oats and wheat, which preceded it in the rotation. This fact contains a pointer for the practical farmer, who, instead of using an expensive agent like lime, as a decomposer to make inert plant-food available, may use clover in rotation with both profit and effect, for it not only enriches and mellows the ground on which it grows, but the crop which is cut and gathered becomes the means of enriching other fields. It must be borne in mind that it is not the food which contains the highest fattening qualities that makes the richest manure: a ton of clover furnishes more of the elements of fertility than a ton of corn-meal. In its manurial value it stands second only to wheat bran and oil cake. It performs a very important office in the rotation of crops. All plant-food must be soluble in water before plants can feed upon it, and when thus soluble, if not taken up by the plant is in danger of being washed beyond its reach by the rains, and when once beyond the depth we plow, would be lost forever, but for some agency to bring it to the surface again. Clover sends down its long tap roots like faithful scavengers into the subsoil, and they perforate the solid earth in search of the necessary plant-food, which by the action of the rains has been carried beyond the line of cultivation, and much of the nitrogen and phosphoric acid which would otherwise be lost as plant-food are thus assimilated and become stored in the tissues of clover. In order to appreciate the force of what has been said of nitrogen in clover, let every farmer keep steadily in mind the fact that when he buys it in fertilizer he pays seventeen cents a pound for it, besides taking the risk of being cheated, and also let him remember that one hundred and twenty pounds, the product of one acre, would at the same rate have a manurial value of twenty dollars and forty cents. To know how to make good manure at the least cost is the first secret of good farming, for the soil must be fed. We hear frequent recommendations of corn-fed manure, but when it is remembered that the manurial value of clover is estimated to be one and a half times that of corn, we deem it in place to put in a plea for clover-fed manure. In addition to the nitrogen a season's growth would contain also thirty-four pounds of phosphoric acid and one hundred and twelve pounds of potash, which, at regular commercial rates, would give it a manurial value of twenty-six dollars. And here it may be asked if "clover takes from the soil these valuable elements in such large quantities is it not one of the most exhaustive crops that can be raised?" We answer, "if raised and removed off the farm this would prove true, but the practical farmer who knows its value and makes a judicious use of it, will not allow its removal, but will carefully utilize all hay, good or bad, and refuse of clover of every sort and safely deposit it in the farmers' bank, as available agricultural assets."

To raise clover and sell it off the farm for a succession of years could not fail to exhaust the land, and when a farmer sells clover-hay for

less than its feeding value and without any regard for the fertility it contains, it proves either that he is ignorant of its value, does not care for consequences, or has not learned to make a proper use of his arithmetic. Farmers in general concede it to be beneficial to have land lie in clover, yet a little observation will convince one that some by a more judicious use are doubly benefited. Clover does not acquire its full manurial value until it is full-grown and begins to ripen, therefore to prevent its growth, by having it eaten off and tramped down by cattle, is the abuse rather than the use of it.

From the foregoing observations, then, we are led to the following conclusions concerning the most judicious use of this valuable grass: Inasmuch as soluble plant-food is continually being drained beyond the reach of the plow, and as growing clover is the only known means within our reach for bringing it back, it is plain that the more frequently it can be employed in the rotation the better, and as its value consists in what it is composed of and not in the name, the farmer should have it as often as he can, and should use it as often as he has it. The right time to turn over a clover sod is after taking off the hay and seed crops of the first season, for at that stage the root is in the highest state of development. A crop of clover compared with wheat contains as much phosphoric acid and three times as much potash. There is also another element, viz: carbon, of which clover is largely composed. This is drawn from the atmosphere and has on that account, not quotable money value, yet it performs an important office, and is as indispensable as water. Every soil needs carbon to loosen it and to warm it by its combustion. It increases its capacity to retain moisture, and imparts to it a richer and darker color, and is necessary in the soil to keep up a stock of humus, without which the operations of nature's chemist in preparing plant-food, cannot be carried on.

A clay soil, with no organic matter in it, is too tight and compact for the roots of plants to thrive in and nothing so tends to loosen and mellow a soil as cropping with clover. Its roots make their way from two to three feet into the subsoil, and but for the agency of this soil renovator the fertility that is washed beyond the limit of the surface soil would be past recovery, because shallow-rooted crops, like corn and wheat will not go on a mission to recover it. To show by illustration the force of what has been stated, suppose A. and B. have each forty acres in clover; A. turns over the entire forty acres each year; B., to save seed and under the plea of letting his land rest, permits the sod to lie two years and so plows only twenty acres each year. A. gains on B. by plowing down twenty acres more clover, which is the equal of a hundred tons of barn-yard manure, and only needs one rotation to put A.'s farm in a manifold richer condition than B.'s.

We close with the further observation, that the farmer who has learned to appreciate the value of clover, and makes a judicious use of it, has no occasion for laying out his money for ammoniated phosphates, for we have known land, which years ago would scarcely produce thirty-five bushels of corn to the acre, which has been brought into such a condition of fertility from natural sources alone, without the purchase of nitrogen, that it now produces double that quantity.

CARP CULTURE.

By S. SHILLINGER, *Lucinda, Pa.*

(Read at Canonsburg Institute.)

The cultivation of carp is an industry of sufficient importance, to fully warrant the construction of ponds for the purpose; but there exist in many places, ponds used for the collection of ice, or for supplying water for live stock, which could be converted into carp ponds at a moderate cost. There are also many depressions of surface in the land (otherwise almost worthless) which could be filled with water, with comparatively a small amount of labor and made answer the purpose very well.

Carp culture is growing so rapidly in favor in some localities, that every farmer that has wet, swampy lands, heretofore considered not worth the taxes, are rapidly converting such land into ponds and supplying their tables with fresh fish to take the place of salt fish, salty pork, etc., which establishes a diet more palatable and wholesome. Carp are evidently equal in flavor to catfish, sucker, perch and other native kinds. The time that carp are fit for the table is from October to May. During and for several months after spawning time the flesh is soft; and no fish is in good condition to eat for some time after spawning. As to the growth of carp (I think I hear some one say, "how heavy will they grow in a year?") This depends chiefly on the climate and how your fish is taken care of. The United States fish commissioner, Spencer F. Baird, informed me that in Pennsylvania, at the age of three years, four pounds, but the writer has one when four years old tipped the scales at fourteen pounds, and measured twenty-seven inches in length, and that without being fed one pound of feed of any kind, except what was naturally produced by the pond. This may seem to some to be rather fishy, but I have repeatedly drawn off the water to show visitors the construction of pond and what it contained and would be perfectly willing and well pleased to do the same for any one here present.

Let me add that one acre of shallow water can be made to produce more profit in dollars and cents, with the same amount of labor that would be required for any farm crop imaginable. The pond would be all the better for being supplied with the following aquatic plants, namely, water-cress, water-rice, water-mace, water-oats, indian-rice and water-lillies.

A few words on the construction of ponds then will let some one else more able to give information on some important topic. Stone and gravel constitute the best material for the purpose; the first step to be taken, dig down to the clay or solid bottom two and one-half feet wide, according to size of stone, and build the wall sloping back and fill all openings with wedge-shaped spalls, filling up breast with gravel and clay. It is absolutely necessary to have some way provided to drain pond, in case you want to get some of the finny tribe, or to see how they are getting along. Some use tiling while others use oak plank to lay in bottom of pond for drainage, but the writer prefers neither, for a few simple reasons, first, because they become clogged with mud and sediment; second, because they afford a harbor for water rats, minks, and frogs, and all such fish enemies. When you wish to drain the water from your pond, it can be done with a large rubber hose or

gas pipe, by siphoning over top of dam. Every pond should be supplied with a sieve or screen to let the waste water escape without letting the fish pass through. Care should be exercised to have one deep place in pond for convenience, that location would necessarily be near the breast; it is in the deep water that carp hibernate during cold weather. The pond should as much as possible be shallow water—from six to twelve inches, for shallow water becomes warmer in summer, consequently the carp and aquatic plants grow faster. If a stream of water could be led around the main body of water, and made to pass through only one corner near the outlet, all the better, as then the hot sun would warm the water very nicely.

My advice to all contemplating building a pond is to stock with carp from six to eight inches in length, for such sized fish are capable of defending themselves against their enemies, such as devour young carp and spawn. Some may think or even say probably the writer of this article has an axe to grind. Not by any means; I would rather buy a few spawners, as I have lost nearly all the young carp sent me by the fish commission, either by accident or probably by some carelessness of my own.

Before closing I earnestly invite all those who have any experience in carp culture to impart some of your knowledge to me, as I am anxious to learn all I can.

WHO SHOULD PAY FOR THE TELFORD ROADS WHICH WE ARE GOING TO BUILD.

By JOHN L. BALDERSTON, *Kennett Square, Pa.*

(Read at Kennett Square Institute.)

It is agreed by all that our roads are not as we would wish to have them; we are mostly agreed that something should be done, and those who have enquired most fully into the matter, are substantially agreed as to the character of road which we should build, but the wherewithal to build them is the great missing link.

For other public necessities money is found in abundance, for private purposes, near our great centers of trade, expenditure is lavish. Chestnut Street in Philadelphia, has been almost rebuilt within twenty years with towering palaces, many of which have cost enough to build hundreds of miles of elegant Telford road. Railroads are built all over the land, and the money is found somewhere, yet we see our public roads annually converted into mires for weeks and months, and sit down and impotently call on the great modern Jupiter, the sun, to save us by drying up the mud.

Safe and easy communication with the world around us is not only one of the necessities of civilization, but it is part, an important part, of civilization itself. For all distant travel or transport the railroads supply the want but we must be able to reach the station to avail ourselves of it. At present the particularly bad roads in all wet weather are those which must be traveled to get produce to the railroad and supplies from it. Economy, comfort, convenience and humanity alike demand that good highways be immediately constructed leading out from all these shipping points. Let the cost of these roads be ap-

portioned between the townships through which they pass, the state, and the property and persons most benefited, those for instance living within one mile of the improvement. In this way I believe they can be built immediately, and without hardship to any one.

Why, it will be asked, call on the state, why send money to Harrisburg one year to be doled out to us, the following year, less sundry items of expense. Simple because the state collects tax by our present system of taxation from many large interests which the township collector cannot reach, and these are sources which are all interested in the improvement of our public roads. It would be difficult to name any business or corporation doing business, which is not interested in the betterment of our highways. Of what use would a railroad be to its owners if its stations were inaccessible? Every good highway leading to them is a feeder to the road. Let them assist in the improvement.

Every corporation which manufactures anything for sale in the country, or which deals in commodities which go broadcast through the land, is interested in easy communication and should contribute something toward the construction of the roads which make easy communication possible. The hard driving-doctors and the glib-talking agents are alike interested in getting about smoothly and would probably find their self-respect in no sense lessened, when they were conscious that they were paying something toward the smoothing of their ways. Last, but not least, our men of leisure who ride for pleasure, will of course be much obliged to the state for reminding them ever so gently that they who drive should substantially remember the men who toiled that they might have a road to drive upon.

Many of our public men are convinced that the state should do something but the proposed assistance is mostly embodied in the proposition that the state build one or two state highways in each county. Governor Hill, of New York, has laid such a proposition before the legislature of that state. Now, at first glance, this looks very nice, but it does not fill the bill. The immediate want is not for a few long boulevards, the length and cost to which will make them grand, but for the short spur roads at right angles to the railroads. We of Kennett, sometimes drive to West Chester, if the road was better we would drive more frequently, but we can take the train, but if we would go to Unionville, or what is more likely, they of Unionville could come to Kennett, if the road is not fit to drive over or through they can stay at home. Within twelve months this town was blockaded by sloughs on every road approaching it, not a few of them in the borough limits. It is to be hoped that before the new century such a state of affairs will be considered disgraceful.

Now why should we assess property most benefited to pay a portion of the cost of these highways? Simply because we cannot do all our roads at once, and without such a provision we can scarcely make a commencement without causing jealousy among those who do not happen to be in a situation to use the proposed road. Secondly, because it would be substantially just to do so, as those against whom the assessment was laid would find their property increased in value much more than the amount of the levy. One-third of the cost of the stone work upon a first class Telford road, fourteen feet wide, would be a tax of but little more than one hundred per acre upon a strip two miles wide, through which it would pass. What reasonable man would begrudge that amount to hear his horses footfalls ringing on a

hard road to the post office and the station, three hundred and sixty-five days in the year. This assessment be it remembered should not be in boroughs, according to frontage at all. It might often happen that of two neighboring farmers to whom the road was an equal convenience, one might have a mile of frontage and the other none. Let those having equal advantages pay an equal amount.

Factories, mills, nurseries or quarries, or other large freighters might properly have proportionally large assessments if their teaming would thereby be greatly relieved. It would not be difficult for a judicious jury to do approximate justice. There would of course be some appeals and some second juries called for, but the fairness and justice of the plan, would commend itself to our people at large.

An incidental but important advantage of this plan is that it would discourage the wasting of much money on by-roads. Persons will be likely to stop to consider whether a proposed improvement is worth the cost if a considerable part is sure to be assessed against the petitioners.

Let us have a plan which will assist in making genuine highways of those roads which much travel must pass over. The by-roads can wait awhile.

There is a bill now before the legislature, prepared by the road commission, which deserves the careful consideration of our people.

It has been drawn with care and contains some excellent provisions, particularly that which provides for the election of an officer to be called the county engineer. Such an official will be necessary for several reasons, especially when an improved highway is to be built in or across two or more townships.

Section eight of the bill says that supervisors shall serve without pay. Section twenty-three says that penalties shall be imposed upon them for failure or neglect. An old law, perhaps unwritten but always in force, says no pay, no responsibility. There is beside entirely too much work in an ordinary township to be done gratis. Let them be paid as at present and then they can be held responsible.

An item in section three says that no unnaturalized person can be employed upon a public road. This is utterly uncalled for, and may work serious inconvenience at a busy time. Strike it out.

Section twenty is the kernel of the whole bill, it reads as follows: "That all moneys appropriated from time to time by the legislature for road purposes, to be paid out of the state treasury, shall be divided among the several townships of this commonwealth in proportion to the amount of road taxes collected, and expended by each township for road purposes during the preceding year, and such share or portion due each township shall be paid by the State Treasurer to the township or district treasurer, or the treasurer appointed by the supervisor as the case may be. The supervisors of each township shall set apart at least twenty-five per centum of all road taxes collected each year which, with the moneys appropriated or received from the state for road purposes, shall constitute a special fund to be kept by the treasurer in a separate account from other road funds, and shall be expended exclusively in the making of macadam or other permanent roads in the township, according to the provisions of section fourteen:

Now this would be better than nothing, perhaps it is the best that can be passed at present, if so let us not antagonize it, but I believe the plan outlined in this paper would allow the good work to go on much more rapidly and that without running us into debt.

SHEEP HUSBANDRY.

By A. H. OLMSTEAD, *West Spring Creek, Pa.*

(Read at Union City Institute.)

I was invited to attend the farmers' institute at Union City, and prepare a paper on sheep husbandry. I consented on the ground that I would not be expected to advance any new ideas; simply my own experience and the ideas of others, with the expectation that practical farmers would take up the subject and bring out all there is in it.

A great deal has been written and many have spoken upon the subject.

It is generally conceded that any one can write or speak on the subject of sheep husbandry.

I find it very much as Pat said, "every man cannot be a poet any more than a sheep can be a goat."

So I find every farmer like myself who expects to soar to the skies in flowery imaginations will soon find his wings clipped and be left in a barren waste where thoughts do not abound.

I have kept sheep for several years; I have tried to post myself with regard to the subject. You ask the man that keeps the fine merinoes, and he is apt to think they are the only sheep of any profit or from which a person can receive any dividend; he will spend hours in praising the quality of the wool; generally has not much to say about the profit from early lambs.

My flock is crossed with the Southdown and Cotswolds. The last two years I have been crossing with the Shropshiredowns. I do well with lambs and wool. Last year my flock sheared on an average seven pounds per head.

A couple years ago I happened to sell my wool at the same time and place that a merino man sold his. He received four cents per pound more than I did; it made me feel a little sore; I asked him the number of his fleeces; I then found what an average fleece was worth; I then got my average. I had received forty cents more a fleece than he did, so I found pounds was what counted. Many of the new grades are like the new varieites of potatoes, have a weak spot.

My idea is, a person must get a flock that is adapted to his locality; for hilly, rough land the long-legged sheep do the best; for more level land the heavy, shorter-limbed sheep are required. I have noticed that the man that cares for the sheep has as much to do with the general welfare of the flock, no matter the breed. If he is gentle and liberal with his feed, and provides warm quarters in winter and shade in summer and is regular with them, they will acknowledge him as their keeper and protector; he will always have a contented fat flock.

One of the worst things a person can do is to sell your best lambs and sheep. I did that a few times and I soon saw my mistake. Let a person follow that only a few years, and his flock will run out and then he will quit the sheep business. Save your best and sell such as you do not want and how soon your flock gets hardy.

There is an old foggy notion that in-breeding is not profitable; that a person must not keep one flock on a place more than four years. I have watched this, and I find a strong ram from a few miles away will cause a change all through the flock, as well as to sell and buy a new flock.

From the earliest period of the world sheep has been domesticated by man and appropriated to his wants. Cain brought of the first fruits of the ground an offering to the Lord. And Abel he also brought of the firstlings of his flock and of the fat thereof. During the antediluvian age there is no authority for supposing that the flesh of the sheep was used for food, vegetables and bread being the only material of human sustenance.

The sentence to Adam is: "Cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life, and thou shalt eat of the herbs of the field; in the sweat of thy face shalt thou eat bread."

The language to Noah after the deluge is very different: "The fear of you and the dread of you shall be upon every beast of the earth, and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes; into your hand are they delivered; every moving thing that liveth shall be meat for you. Even as the green herb (which was formerly appointed to be your food) have I now given you all things."

But many centuries elapsed, notwithstanding this divine permission, before the flesh of animals generally was used.

Although the flesh of the sheep was so long excluded as an article of sustenance the milk of the ewe was appropriated to that purpose by the antediluvians. Ewe's milk was used in the manufacture of cheese many centuries before there is any record of this article of human sustenance being derived from the milk of the cow. Ewe's milk cheese was often made in the early times on a large scale, and was a very material and valued article of food.

Mr. Burekhardt gives the following account of the manufacture of butter from ewes and goat's milk by the Syrian Arabs:

The sheep and goats are milked during the three spring months, morning and evening. They are sent out to pasture before sunrise, while the lambs or kids remain in or near the camp. About ten o'clock the herd returns and the lambs are allowed to satisfy themselves, after which the ewes belonging to each tent are tied to a long cord and milked one after another. When a ewe is feeble in health, her milk is left wholly for the lamb; the same process occurs at sunset.

From a hundred ewes or goats, the milk of which is mixed together, the Arabs expect in common years, about eight hundred weight in the three spring months.

The Arabs commonly encamp on the top of some little hill where there are no trees to hinder them from discovering, a great way off, all that come and go, that they may not be surprised, having nothing else to fear.

Parsons, the traveler, says: It was entertaining enough to see the horde of Arabs decamp. First went the sheep and goats in regular divisions, then follow the camels and asses loaded with the tents, furniture and kitchen utensils; these were followed by the old men and women and the boys and girls on foot. The children that could not walk were carried on the backs of the young women and the boys and girls. The smallest of the lambs and kids were carried under the arms of the children. The procession was closed by the chief of the tribe mounted on the very best horse.

On the authority of the Scripture, the flocks which abounded in Palestine were very numerous. Job had fourteen thousand sheep, besides oxen and camels.

When the twelve thousand Israelites made an invasion into Midian

they brought away 675,000 sheep. When the tribes of Reuben and Gad made war with the Hagarites their spoils amounted to 250,000 sheep. The king of Moab rendered a yearly tribute of 200,000 sheep, and Solomon offered 120,000 at the dedication of the temple.

There are several circumstances which will readily account for these numerous flocks. They constituted almost the only riches of the people. Comparatively few were slaughtered for their flesh was rarely eaten.

There is reason for believing that the ewes had lambs twice in a year. The first, and indeed the only, improvement in sheep breeding which the Sacred Book informs us, is relative to the fleece, the color of which it is generally believed was originally tawny or dingy black. Although the fleece is now so generally white, yet instances are not uncommon in some of the best bred flocks which indicate the tendency to return to the original color. This is perceptible in the legs and faces of the distinguished Southdown.

The motive which prompted Jacob to attempt a change of color originated in a bargain between himself and Laban, that the former should have the speckled or ringstreaked sheep and goats as a compensation for his services. There could hitherto have been very few and were of course accidental, or the selfish and avaricious father-in-law would not have consented to the proposal.

The Scriptures are silent relative to any peculiarities of the form of the ancient sheep, saving that the ram was horned.

When Abraham, in obedience to the divine command, was about to sacrifice his son Isaac, his arm was arrested by a voice from heaven, and he lifted up his eyes and looked and beheld behind him a ram caught in a thicket by his horns. The trumpets used in war were made of rams' horns.

The polled sheep were probably an accidental variety, and when first occurring, cultivated partly for their singularity, and more for their utility the closeness of folding of which they were capable, the fewer accidents that were likely to occur, and most of all from the superior docility and quietness of those to whom nature had not given these weapons of offense, the use of which all animals soon become so conscious.

A prominent characteristic of the ancient shepherds was their humanity and extreme watchfulness of their flocks which should put the blush on very many modern shepherds.

The time appears to be past that a great amount of care is given to sheep; many think a yard around a stack of straw or hay, is sufficient shelter for sheep. I know that sheep suffer from the heat of summer, the cold rains of fall, winter and spring, and are very sensitive to cold winds of any kind.

With regard to the different species I will not have anything to say, for all have their friends. My experience is that six or seven sheep will eat as much as a cow, and I believe the sheep pay best, taking into consideration the care, labor and the cheapness of the products of the cow.

Many claim they cannot keep sheep as well as cows, on account of their fences. If a sheep has plenty to eat and a good place to be through the heat of the day, where they can be secluded and cool and dry, they will not wander away, hunt far holes nor climb very high. About the year 1800, my grandfather settled in Ulster county, New York State, near the foot of Catskill mountains: he purchased a small flock of sheep and intended increasing so he could afford to tend them,

and allow them to feed over the lower hills; he was obliged to bring his flocks in before dark, and shut them in a fold made of heavy logs about seven feet high to keep them away from the wolves.

The disposition of the sheep is of a timid nature; one worry of the dog will keep them near the buildings; they will nearly starve before they will venture far; let a bird fly up and they will run without even looking to see what is the cause. Several times I have heard men remark, "I have tried to keep sheep, but the dogs killed all my best ones, the balance were so timid they would not do well."

The State of Pennsylvania pays yearly about one hundred and twenty-five thousand dollars for sheep killed by dogs. My county pays thousands of dollars yearly for sheep killed by dogs.

Still the dogs kill sheep, and men growl because their dogs are taxed. I do not keep a dog; I like a good dog, but experience has taught me that a dog and sheep will not do well together. I am perfectly willing my neighbors shall keep dogs but they must leave my sheep alone. All around me my neighbors keep dogs; they do their own barking and mine too, they tramp my vines, wallow on my beds of onions, run out and scare my horses, bark at my heels, even come and sit in my door yard and bark at the man in the moon all night. I have sheep land of my own, I teach my sheep to come in every night and lay in a yard; if a dog goes in there, down comes my rifle and down comes the dog. I have not lost a sheep for ten years. I find the dog is like his cousin, the wolf; he puts in his work at night or very early in the morning so if you are around and take a walk with your sheep, when you let them go, the dog does not want to be caught at his meanness.

According to statistics we find that there are not so many sheep raised by a large per cent. Secretary J. M., Rusk, in speaking in his report of sheep and wool said, "I respectfully call your attention to a fact full of significance in this connection. There has recently been a serious interruption to the prosperity of wool growers. Since the reduction of the tariff in 1883, the number of sheep have apparently been reduced about seven million, and the importation of wool has increased from 78,350,651 pounds to 128,487,729 this last year. Wool growers are despondent in view of low prices of wool and their interests are threatened in consequence.

I think on account of the discouragement of having them killed and frightened, I myself might fence a large area, and soon bring it in good pasture. If I could confine my sheep there they would destroy the briars and young sprouts, but I would not dare to do it.

Some of my neighbors have lost sheep this winter: I never lost any; the cause of this is constipation. A friend of mine came to me and said my sheep are sick, I have lost several, and I want to know what to do; I inquired how do you feed them? what kind of grain do you feed? I am not able to feed grain, but feed them all the good hay they can eat; I told him to go home and give the sick ones half a tea-cup of lard and sulphur mixed, morning and evening, until they began to eat, and let the sound ones have plenty of salt and sulphur, and at least twice a week, a mess of bran, potatoes, carrots or anything relaxing. In a few days I saw him; he said the sick got well and the others were more anxious to eat.

I have noticed that many confine their sheep in a yard without proper exercise and water. If a sheep can get snow to eat they will live; but you take a couple pails of clean water and set them down, see how

quickly they will empty them. One of my neighbors lost several sheep with the grub in the head. I never lost any. I tar their faces early in the spring, and then in shearing time again.

I was talking with a gentleman a few days ago, who said his run out with the foot rot. I always keep a bottle of vitriol water, and a couple of applications always cure. Take a quart bottle of any kind, and place two ounces of blue vitriol and one ounce of carbolic acid in it and fill up with water. I have used this for years, and it will cure if used early; your sheep will not be lame long. Some claim a sheep is a coward; they are so timid, they will not fight for their young nor resist disease, nor fight for life like another animal; they know a great deal, and if you are a close observer you will soon see it. A few days ago a ewe came up and began to bleat pitifully. I went out, she came up to me and bleated and started off and stopped and looked back; I followed, she led me to her lamb a long distance from the building; her lamb had got in among some logs and could not get out. I took the lamb in my arms and she trotted by my side perfectly satisfied. Be kind to your animals and they will reward you tenfold.

WHAT FARMERS SHOULD READ TO PROMOTE THEIR INTEREST AS FARMERS.

By SAMUEL SHILLINGER, *Lucinda, Pa.*

Before making any remark on what farmers should read, I beg leave to say a few words on what they should not read nor suffer to be read by any member of their family. No trashy literature of any kind whatever. Any man of ordinary intelligence can at a glance see by looking through the advertising columns of a paper, if the editor of such paper is of good or bad moral character. (By their fruits ye shall know them.) If you find advertised whole pages of quack doctors, wonderful cure-alls, photographs of female actresses of ill repute, matrimonial papers, counterfeit money and many other clap-traps, that they themselves would not dare to invest any money in, and last but not least, those degrading, brain-softening, love stories. Now, if you find any such quack besmeared sheets, pass them by and bear in mind the editor is one of those trees that bring forth evil fruit. This country is flooded with cheap worthless reading matter of various kinds. If you don't take a paper worthy of the name, it will be some of the above-mentioned kind that your children will read. Nearly every farmer has parental duties and responsibilities which he cannot evade without the most serious consequences. The most important of these responsibilities is his children. The proper educational influence of such papers as the *Ohio Farmer*, the *Farm Journal*, and the *American Agriculturist*, upon children cannot be estimated. If the sons are to be farmers they grow up under this influence with such a knowledge of their vocation, as will enable them to take their place in the front rank, and successfully compete with his less informed competitor. In these days of great competition and small profits, it is only the farmer that is possessed of every advantage which science and inventive genius have

made available, who can succeed. The most valuable legacy you can give your son, in a pecuniary way, is an education that thoroughly prepares him for his life work. One of the most effective agents in bringing about such a preparation is a live agricultural journal. All doubts in the matter will be laid aside when you make a thorough examination of the different departments of the *Ohio Farmer*, and we find it to be just such a paper as is adapted to our wants. Its general make up in its practical departments is of the advice, opinion and experience of farmers, fruit growers, poultry keepers, apiarists, dairymen, stockmen and their wives and daughters, and is a sixty-four column paper with about twice a month an extra supplement of sixteen columns, making the paper in reality, a seventy-two column paper, at the paltry sum of one dollar; it should be a weekly visitor at every farmers' home in the land.

Take any farmer that has made money out of his farm, and I will show you a man who reads and thinks; he plants those crops that are suitable for his soil and climate, raises the kind of stock that experienced breeders found the most profitable, uses the most approved machinery, takes care of his stock and tools, and still he finds time to read a good agricultural paper, as everything comes fresh from the field, and is a lesson of actual experience. The editors' duties consist in keeping posted on the demand for information which he draws from his large corps of correspondents.

'Tis an old saying that children are continually doing something, and without the least shadow of doubt that something must be either good, bad or indifferent, as the case may happen to be; this in a measure takes a like effect on moulding the future character of the child. Parents should use their best influence to induce the youth to read good books and papers, and finally they will form a habit of spending leisure hours in a good and useful manner; by reading we gain knowledge, and knowledge is power, and power is mighty in the hands of the fortunate possessor, and no intelligent man will deny, that it pays to take time to read. Head work on the farm is just as essential to success as is manual labor. But then you might just as well try to persuade a child to fall up the stairway, instead of down, as to urge some men to do anything against their will. You will occasionally meet an individual who will gamble, drink, chew and smoke to excess, and yet their plea will be, I can't afford to take a paper for my children to read: its such men that imagine they know all about farming that won't take an agricultural paper. To all such I will say there is always room to learn, and I do not care what your occupation is in life, the more you learn the more you strive to learn, and the more you become informed, the more you are willing to acknowledge your ignorance. You can hardly pick up a paper without reading of some victim being taken in by sharpers. The angel unawares appears to the farmer in a very slick suit, and still a slicker tongue, and quietly pulls the wool over his eyes, and persuades him to sign a contract, and finally fleeces him out of a goodly amount of property. This kind of affair is due to the fact that the unfortunate parties are not well posted and informed. An editor of a meritorious paper is continually warning his readers not to sign any contracts with strangers. This evidently shows that such victimized parties either take no good paper or don't take time to read at all.

SMALL FRUITS FOR THE HOME AND FOR PROFIT.

By JOHN G. REED, *West Mill Creek, Pa.*

(Read at Erie Institute.)

It has been said that when a man finds he has started out on the wrong road the best thing he can do is to turn squarely around and go back and start right.

Happily for the farmer, he need not go back to make a new start, but can start a reform at any time when he finds he is wrong.

My subject, "Small Fruits for the Home," or for the farmer, is one that has often been advocated in the papers of the day, and a few farmers have profited by the advice, but, strange to say, there are many farmers that do not know the value of fresh fruit in its season on their tables. No doubt any one here to-day could name many of their neighbors that have not a single strawberry or raspberry plant growing on their farm, unless possibly nature has come to their assistance and produced a few wild ones in some neglected fence-corner.

Many persons think that it requires a large amount of both time and money to produce small fruits sufficient for family use, while others think it such small business that they will not bother with it, and say, "I can buy what we need." But when the season comes around, they say, "Oh! how high berries are!" and buy few or none, and so deprive themselves and families of, I might say, one of the necessities of life: certainly one of life's luxuries.

As to the cost of producing sufficient for home use, it would surprise many if they would try and plant a few rods square in the garden, and give good cultivation. Get a few dozen plants each of strawberry, raspberry and blackberry, and you will have a healthful dessert for the table for about two months of the year, at a time when other fruit is not to be had.

The Soil. Many think the land must be of some particular kind to grow small fruits. This is a mistake in a great measure. Of course some land is better adapted to growing plants than other land, yet almost any land can be fitted for the plants. Naturally, dry clay loam, perhaps, is the best, but with good drainage and yard manure, together with all the wood-ashes to be had, you are assured of success. Sandy soil produces perhaps the earliest fruit, but is often deficient in moisture at the time of ripening. As a rule good corn land will grow small fruit with very little more expense than a corn crop.

Varieties to Plant. The value of a knowledge of varieties can hardly be over-rated by fruit growers. And for this reason they are always anxious to get the truth concerning new sorts: this is not always easily obtained. Men who are interested in the sale of a new variety say all they can concerning the good qualities of the particular variety and nothing of its defects, and the inexperienced are often misled by getting only part of the truth. Often the new variety needs a particular soil or a particular mode of cultivation in order to succeed.

I think the best plan to determine what to plant would be to plant such varieties as are known to succeed in your immediate locality for your main crop, and try the new varieties on a small scale, and satisfy yourself in regard to whether they suit you or not. Varieties have been improved from time to time, and are being improved every year, and unless we try the new sorts we will get left in the race of progress.

It would take a very smart man to say which is the best variety of any of the fruits now in cultivation, as some succeed better in some localities than in others. Then your market will in a measure decide what variety to plant. Men who plant largely should, as a rule, raise their own plants. They will then know them to be true to name and well grown, and they can plant them at the most favorable time, and are almost sure of a good stand.

In selecting varieties one should choose such as will make a succession from early to very late. This will lengthen the season, with most sorts, nearly two weeks, and need not include more than two or three varieties of each kind of fruit. Crescent, Sharpless, Manchester and Kentucky for strawberries; Tyler and Gregg for raspberry; Britton, Snyder or Erie for blackberry.

Time to Plant. I have always taken an interest in the fruit business, that is, ever since the time I was sent out to the fields to pick wild berries, but a change came in time when one of our neighbors planted a patch of the Old Wilson strawberry and raised such large berries that astonished the natives. Of course everybody wanted plants, and some succeeded and some failed. But this was the start of the small fruit planting in our locality.

Now as to the best time to plant, my experience has taught me that the spring of the year is by far the best for all small fruits. Then the soil is in the best possible condition, and the plant, just starting a new life, will quickly take root and have the whole season to develop and prepare for a crop the next season. The only reason I can give for planting in the fall is to save time the next spring, but in our climate it only makes double work and loss of plants. For most likely nine-tenths of them will be dry and dead by the next spring.

With my experience as a fruit-plant grower, I cannot recommend fall planting and do justice to myself or my customers. Of course I am only speaking of Erie county climate. In a more mild climate it might be different.

To gain the benefit of spring planting it should be done as soon as the soil will work light, say the latter part of April, or the first of May.

Time to Secure Plants. If you have to buy your plants you may get your strawberry, blackberry, currant or gooseberry plants or grapevines some time before you can plant, and if proper care can be taken, they may do well. But for raspberry plants the sooner they are set after they are received the better, as they are very tender, and if they get once dry or heated they will not grow.

My subject seems to be a double one, "Small Fruits for the Home and for Profit." As profit comes largely from the money received for the crop, it is highly important that the fruit be well marketed; and to do this to the best advantage requires personal attention to, and a fair knowledge of, the markets. As a rule the home market is the best. Sales made either to the consumer or the retail dealer will give the best results. Then you know what you are getting every day. If you trust to shipping and the commission merchant you may and you may not do well; sometimes you will not get more than will pay commission and express charges, and probably lose your boxes.

In preparing for market put the fruit in such shape as the particular market requires. Always remember to have your fruit uniform throughout. If you have any poor fruit, better leave it at home or pack by itself, and sell for what it is, than to face it with good fruit and lose your reputation.

The ideal strawberry has not yet appeared, and so we will have to get along with the best we have until some one brings out a variety that will grow about two feet high and produce fruit about as large as tomatoes; until then let us raise for our main crop some standard variety, and try the new sorts as they appear and keep up with the times.

It costs but little to try a new plant or vine and know for one's self of its value. Our country is getting larger every year, and the demand for fruit of all kinds is increasing, so we must inform ourselves as to what varieties are the most productive and the most profitable for us to raise, and be careful about going into that which we know nothing about. Let us always remember that "Nothing succeeds like success."

THE JERSEY COW.

By J. C. SIBLEY, Esq., *Franklin, Pa.*

(Read at Titusville Institute.)

The most hopeful sign of the times to the agriculturist and dairyman is such a gathering as this one. Here we can work together to draw truth from the bottom of the well, where she is said to lie hidden, and by the interchange of thought, the gentle friction of one's ideas and experiences with another's, we shall do much toward perfecting and polishing the setting which encircles the precious gem.

Another and most hopeful sign, is the agricultural press of to-day. The one hundred and upwards of agricultural papers published, most of them of high order of merit, and presumably, financially successful, are indicative of the fact that the American farmer of the present is keeping posted on what pertains to his vocation. Some one asked one of the old master artists, with what he mixed his colors to produce such grand effects. "I mix them with my brain," came the ready response. The farmer of to-day is not necessarily any longer a mere drudge. He is mixing the labors of his hands and brain. Some great statesman years ago spoke of the grand future of this country because the schoolmaster was abroad in the land. The agricultural press, the great educator, is abroad in the land, and he who neglects the advantages to be derived from reading some of the papers, will do so not alone at an intellectual loss, but a pecuniary loss as well. As well may the would-be statesman refuse to read history; the lawyer Blackstone and Chitty; the politician current politics, as the farmer the latest achievements, the records of the successes and failures of his brethren. Experience is a dear school; and he who can profit by the experience of another, is the truly wise man. I do not say for you to believe all you hear and read in the agricultural papers; but I do say that he who cannot by taking two or three of the leading papers of the country, get out of their columns in dollars and cents, ten times their cost, is the man who is blind either in his eyes or his understanding.

As I have before remarked in public, the time has gone by when the fool of the family is made the farmer. He is now reserved to be the speculator and the politician. The farmer who would succeed must keep step with the music, and near the van of the procession. There

has come into the mind of the eastern farmer, owning high-priced lands, the question how to compete with the cheap and fertile lands of the great west. Clearly, he cannot compete in their specialties, and therefore must school himself to the new order of things.

He must make one acre of land produce double what it did before. He cannot grow beef as cheaply as it can be done upon the great grass ranges and the fertile cornfields of the west; but he can produce an animal which will give him twice the quantity of milk, butter and cheese that his scrub cow has been yielding for him. Thousands of carefully conducted experiments, always with similar results, covering a period of over a third of a century in this country, clearly prove that the Jersey cow can perform this self-same task, of doubling the products of the dairy. This is a matter of vital importance to all thoughtful and prudent men, and I trust will command your attention, while I go into it in detail. The early history of the Jersey breed is obscure. From their delicate shadings, large and mild eye and fawnlike appearance, arose no doubt the tradition which is still cherished on the Island of Jersey, that the breed originated through a union of the cow and the deer. It at least remains as their history, that over one thousand years ago their peculiar qualities were such as to excite among writers the presumption that they originally came from Normandy, as many of the characteristics of the breed are observable in the cattle of Normandy and Brittany. The difference existing to-day is doubtless owing to the difference in climate, care and surroundings. It may be of interest to some if I give a slight history of the home of these cattle. The Channel Islands are four: Jersey, Guernsey, Alderney and Sark. They have been part of the possessions of England since the days of William the Conqueror. They are in the English Channel, sixteen miles from the coast of France.

These islands, washed as they are by the Gulf Stream, possess perhaps the finest climate in the world, with the fruits of the tropics and the far north. The Island of Jersey, the largest of the Channel Islands, is but seven miles wide by eleven miles long. The total amount of tillable land is but twenty-five thousand acres, and the population sixty thousand; or upwards of two persons to each acre of land; and one cow to each one and a-half acres of land. This may seem like close farming. Nevertheless, these islands produce sufficient for their own needs, and these people, per capita, are the richest agricultural community in the world. Necessarily the cultivation of this land must be of the highest order, and the available product of each foot of land carefully considered. Within the limits of this address it will be impossible to state the methods of rotation and tillage. Such as are interested, I would refer to the Encyclopedia Britannica, or to an admirable essay by Col. Geo. W. Waring, published by the A. J. C. C. Suffice to say that the rich and succulent forage, long continued, has been no doubt a great factor in the development of this marvelous butter breed. Another aid in the development of this distinct species is that of in-breeding. For generations, so highly has the Jersey man prized his cow, that their most ancient laws enact the most severe punishment for the importation of any cattle to these islands: even a ship for landing such animals being subject to confiscation. So much for the original home of this cow.

The history of the Jersey cow in America covers but a comparatively brief period: the first importation having been made in 1850. These animals were bought more for beauty than for any belief in their dairy

capabilities; but one gentleman, Hon. Thos. Motley, was so impressed with the earnest protestations of the Islanders upon the richness of the breed, that he was in 1853 induced to set the milk of one of his cows separate for one year. The result was 511 pounds of butter, considered, in those days, a marvelous yield, but since then over and over again, greatly exceeded. The attention of the public was not called to these cattle to any extent until the formation of the A. J. C. C. in 1868. From that date until within the last six or seven years, the Jersey cow was still considered more in the light of a luxury, and an ornament for the rich; although remarkable butter tests were being from time to time reported. Some of these run from fourteen to nineteen pounds in seven days, on grass alone; and some with a moderate grain allowance, at the rate of twenty-eight pounds per week. Some few years since Peter C. Kellogg, under the *nom de plume* of Hark Comstock, wrote several articles under the heading, "Look into the Churn." The result was that Jersey breeders commenced looking into the churn.

The owner of Jersey Belle of Scituate looked into his churn and found that his cow gave him twenty-five pounds three ounces of butter in seven days, and seven hundred and five pounds in a year. The owner of Eurotas looked into the churn, and found his cow gave twenty-two pounds in seven days, and seven hundred and seventy-eight pounds in a year and dropped a live calf; the highest grain feed for any one day during her whole year having been eight quarts. The owner of Mary Anne, of St. Lambert, looked into his churn and found that on pasture and five quarts of ground oats daily, his cow gave one hundred and six pounds in one month and eight hundred and sixty-seven pounds fourteen and three-fourth ounces in eleven months and five days. She has since tested thirty-six pounds twelve and one-half ounces in seven days. Ida of St. Lambert, gave thirty pounds two and one-half ounces in seven days, and Princess Second, forty-six pounds twelve and one-half ounces in seven days. Oxford Kate gave thirty-nine pounds twelve ounces in seven days. There have been separately tested something over fifteen hundred cows, that have produced from fourteen pounds to forty-six pounds twelve and one-half ounces in seven days; and right here allow me to state that all these greater tests, have been officially conducted by committees appointed by the A. J. C. C., by agricultural societies and by those in many instances who were loudest in their criticisms. The rules providing for the official test of cows are so stringent that there could be no deception, were the owners ever so anxious. I do not wish to be considered as boasting in referring to our own herd, for we recognize the fact that there are many herds equal in butter production, and I merely refer to it as showing the uniform butter producing power of this breed. Last season we set separate the milk of nineteen cows, and but two of the nineteen failed to give from two to four pounds of butter per day.

These tests have been on moderate feed. Not on the high pressure plan of risking the life of the cow to make a great test. We wish to be distinctly understood. We have some poor cows in our herd; but we want it also to be understood that no man can pick out of our herd two cows (excepting only some very aged or injured animals kept only for breeding,) that cannot make over three hundred and sixty five pounds of butter in one year. This statement is made in absolute confidence in its correctness, and we think it is under, rather than over

stated; and we doubt if there is a herd of average excellence that cannot do as much or more.

It is a matter of some extra trouble to set the milk of cows separately for long periods, and churn each by itself, but many of our cows by tests for shorter periods have indicated a capacity of over six hundred pounds of butter per year. We have one cow, Matilda 4th, that for the present twelve months we expect will make between nine hundred and one thousand pounds, without forcing. For the eight months to December first, the lowest possible estimate on her production is 656½ pounds. Her milk was set by itself for periods from one day to seven days in May, June, July, September and November. For all the time prior to October, each day was estimated at less than her lowest tested day. Since that time she has been estimated daily by the average yields in the subsequent tests. Her feed has been precisely the same, both in amount and kind, on the days when her milk was churned by itself, as when it was churned along with that of the other cows in the herd.

But it is urged against the Jersey cow that she is small and of no value for beef. Allow me to repeat what I have stated on previous occasions, that as yet I have to find the owner of a Jersey cow who is desirous of converting her into beef. So long as she will breed she is more valuable for other purposes.

But let me be clearly understood in the following statement, that give me a Jersey cow dry—if it be possible to dry her off—and I will make beef cheaper and quicker than with any other breed with which I am familiar; and that beef will be of as delicious quality as man ever put into his mouth. We grew tired of hearing the claim that the Jersey cow was no use for beef, and gave it a practical test, worth at any time a ton of theory. We took a cow which was no longer a regular breeder, and on a feed of three hundred and fifty pounds corn meal increased her live weight two hundred pounds in eight weeks. Now that I have shown you the fact, I will give you the theory, which is this: The Jersey cow excels all others as a butter producer because of her perfect organs of digestion and assimilation, which extracts the fat from her food and deposits it as butter in her udder. That which in the ordinary breeds is laid on the carcass, is in the Jersey put into the churn. When the Jersey cow is dry, you have to reduce her allowance and use the greatest care that in the interval before calving, she does not become too fat for safety in calving. That which she put into the churn when milking, she is, when dry, putting on her carcass. When a cow that makes nearly seven pounds of butter per day goes dry, she places that fat on her ribs; and I guess she does it as quickly and as cheaply, pound for pound, as any cow in the world. Pardon my digression, for I am not advocating the Jersey cow for a beef breed. The first cost is too high. The cow is worth more for other purposes; and the east with high-priced lands, cannot compete with the plains of Kansas, Colorado and Texas in the production of beef. And yet the average dairyman says he don't want the Jersey cow because she can't make beef. What does he want? He is not in the beef business. What would you think of the man who would say he would never buy a sulky hay rake, but would stick to the wooden hand rake, because when it was worn out it would make a mop handle? But it is said that while the milk of the Jersey cow is rich, she gives but little in quantity.

We will grant that there are some larger records in other breeds, but

it must be borne in mind that very little attention has been paid hitherto to the amount of milk that Jerseys would give; the interest having been centred, principally, in the amount of butter that they would make. Nevertheless, we believe that Jerseys are far above the average, even in the amount of milk yield. The following are some of the yields in our herd: One cow has given sixty-seven pounds of milk per day, and averaged over sixty-five pounds of milk per day for a week. Another given sixty pounds of milk per day and has averaged over fifty-seven pounds of milk per day for a week; another has given fifty-six pounds per day and averaged fifty-three pounds for a week. Many of our cows have given from forty to forty-eight pounds per day. All our milk is weighed just as soon as milked, and all the records kept of every cow. Here are some of the yields: Matilda 4th, 11,167½ pounds for the eight months to December first; will probably yield over 16,000 pounds for the twelve months without forcing. La Petite Mere 2d, 10,329 pounds in one year, on ordinary feed; in calf seven months of the year; With a little extra feed we believe this cow capable of yielding 15,000 pounds per year. Fawn, of St. Lambert, 10,101½ pounds with her first calf, in twelve months, ending before three years old; had extra feed for four months only. Queensboro', 8,622 in eleven months; in calf eight months. Cill, of Glen Rouge, 7,008 pounds in one year, with first calf on ordinary dairy feed. Duchess of Darlington, 7,936 pounds in twelve months; ordinary feed; in calf eight months. Butterfly, 7,806 pounds in eleven months; ordinary feed; in calf eight months. Mary, of Pleasant View, 7,655½ pounds in ten months; in calf seven months. Silverstraw, 7,461 pounds in eleven months; in calf eight months. Golden Zoe, as a ten-year-old cow, 7,277 pounds in eleven months; in calf seven months. Nerissa, of Nyack, 7,136 pounds in ten months; in calf seven months. Goldstraw 3d, 7,036½ pounds in eight and a-half months: four and a-half months in calf. Our cow Ida of St. Lambert, who has milked sixty-seven pounds per day and averaged sixty-five pounds per day for a week, gives indications of yielding for the year between 18,000 and 20,000 pounds. I will promise you beforehand, too, that she shall not be fed one drop of milk or have any stimulant, tonic or drug of any nature, for the purpose of creating an abnormal appetite, or flow of milk. I do not wish to throw discredit on the performances of other breeds, but it is nevertheless current statement that the highest records in some breeds have been obtained by feeding milk in large quantities, and by abnormally stimulating the appetite. In the public prints, time and again Jersey breeders have called upon the owners of some of these great yielders to state what articles the animals were fed, and so far have not been favored with replies.

The Jersey cow is a persistent milker from one calf to another, and it is generally necessary to force her dry. Many we find it impossible to dry at all. The diminution in their flow of milk does not seem to imply a corresponding loss of butter. It is often found the case that a cow giving twelve quarts per day is making more butter than when she was giving sixteen quarts per day. But there are those who will tell us that if they were to feed their cattle of other breeds as highly as Jerseys are fed they would make as much butter. Well, my friend, you try it and see. I predict that you will not have as much butter within a great many pounds; and you will probably have a dead cow if you feed one-half as much as some of these Jerseys have eaten—one cow during an official test having been fed as high as fifty quarts of

grain in a single day. The Jersey cow, with her perfect organs of assimilation and digestion, will take care of such a quantity of grain as would kill the average cow. High feeding to this extent is not to be commended. But many of the largest tests have been made on ordinary dairy feed. The high feeding only shows the powers of the cow to assimilate a vast amount of feed and convert it into butter fat.

To return to the question of whether it is the breed or the feed which makes the butter cow, I beg to quote from Professor Jordan's address to the State Dairymen's Association, February 12, 1885: "Experience is the test of theory, however, and on the point under consideration careful and extended investigations are not wanting. I know that the verdicts of German investigations have been much criticised, and even their correctness has been doubted; but I feel sure that some of this criticism and distrust has resulted from a misunderstanding of the facts as they really are. I have noticed within a few weeks in two of our agricultural papers, statements to the effect that the German experimenters claim that the milk is not influenced by the food. Nothing can be farther from the truth. The results of these searching and elaborate investigations declare, if they declare anything, that while in certain respects a cow has certain fixed characteristics which are beyond the influence of food, in other respects it may be greatly modified by the kind and quality of the food. There is no farmer of ordinary intelligence who does not know that some foods produce milk richer in fat than is the case when other kinds of material are fed. It would be useless to claim that one hundred pounds of milk from a cow well fed contains no more fat than one hundred pounds of milk from the same cow poorly fed, for all experience would deny the claim. The following are conclusions which the German investigations certainly warrant: 1. The percentage of total solids in milk is greater with a rich ration than with a poor ration. 2. The composition of milk solids is, on the other hand, little influenced by the amount and character of the food. In other words, if these solids are one-fifth fat when the cow is poorly fed they will be one-fifth fat when well fed, although the total quantity of the fat will be greater in the latter case because the total quantity of solids is greater. Let me illustrate. My cow gives milk with twelve pounds of solids to the hundred when I feed her on timothy and roots, but when I begin to give her a liberal amount of a mixture of corn meal and cotton seed meal, the percentage of solids increases until one hundred pounds of milk contains fifteen pounds of solids. The solids were one-fifth fat in the first instance, and all previous experiments give me no reason to suppose that they will vary in composition under the influence of the richer ration. But one-fifth of twelve is two and one-half, while one-fifth of fifteen is three, so that the liberal feeding has caused an increase of one-half pound of butter fat to each one hundred pounds of milk.

This hypothetical case illustrates exactly what takes place in actual practice. A cow produces more milk when well fed than when kept on short allowance; but this is not because the solids of the milk change in composition, but because there is more of them. When one constituent of the milk solids increases, they all increase in about the same proportion. I do not mean to say that there is absolutely no change in the composition of the milk solids under the influence of different kinds and qualities of food, but I do mean to say that the food is unable to overcome to any great extent the fixed constitutional habits of the animal. You cannot by any manner of feeding obtain

Jersey milk from a Shorthorn cow. Such evidence as Professor Jordan's is well worth your attention. It simply gives facts without bias as to breeds. It will never do to train Maud S. for a draught mare; nor a Clydesdale for a trotter. Each has its sphere of excellence, outside of which it is as worthless as the veriest scrub. He is a wise man who can accept accomplished facts. Suppose you were to say my native horse can trot as fast as a Hambletonian, or some of the other families of horses that are recognized as carrying speed in their blood; and upon that theory you would commence training Pete and old Dolly. How long will it take you to breed a family of trotters from that train. Why, my friend, you would lose the last nickel in the venture, and in the end your horse will not be able to trot fast enough to keep you ahead of the sheriff. But some wise and prudent farmers say that Jerseys are held at fancy figures, and that no man can get his money out of them for the dairy. Let us make some computations. The scrub cow, costing thirty dollars, and making one hundred and fifty pounds of butter per year, will make, in ten years, fifteen hundred pounds, which at twenty-five cents per pound equals three hundred and seventy-five dollars. Will drop in ten years, ten calves worth, when two months old, three dollars each, equal to thirty dollars. She will herself sell for thirty dollars. Total received, four hundred and thirty-five dollars. At thirty-five dollars per year for keep, the cow will cost, in ten years, three hundred and fifty dollars. The first cost of the cow, thirty dollars. Total paid out three hundred and eighty dollars, leaving a profit, on thirty dollars, of fifty-five dollars, or one dollar in the same has brought in one dollar and eighty-three cents.

The Jersey cow costing two hundred and fifty dollars, and making four hundred pounds of butter per year, will make, in ten years, four thousand pounds, which, at twenty-five cents per pound, equals one thousand dollars. In ten years will drop five heifers worth, when two months old, one hundred and fifty dollars each. In ten years will drop five bulls worth, when two months old, twenty-five dollars each. Will herself sell for beef for twenty-five dollars. Total received, one thousand nine hundred dollars. At thirty-five dollars per year for keep in ten years amounts to three hundred and fifty dollars. Original cost of cow two hundred and fifty dollars. Total expended, six hundred dollars. Leaving a profit of two hundred and fifty dollars on thirteen hundred dollars. Every one dollar invested in Jersey has cleared five dollars and twenty cents. This calculation, although making a showing for the Jersey far preferable to the scrub, is nevertheless unjust to the Jersey, in placing the same price on the butter, which is of a high quality, as on that of the scrub, which is of a bad quality. As a matter of fact, in any large market, the Jersey butter will bring anywhere from five to fifteen cents per pound more than scrub butter. Taking, however, this lowest amount of five cents per pound difference, and reckoning as before, we shall have as a showing a profit for the ten years for the Jersey cow six dollars for every dollar invested in her, as against the one dollar and eighty-three cents profit to the dollar invested in the scrub. If interest be reckoned in each case, which is the more fair method, the result will be strikingly more favorable to the high-priced Jersey. If the females in each case be retained in the herd until the end of the ten years, and interest reckoned on the butter product each year, the results would be so amazingly in favor of the high priced Jersey that I fear none of my hearers would believe my figures to be true until verified by actual computation. But it is said

by some that the Jersey is delicate and must have warm barns, etc. Well let me say, I have ever yet to see the breed of cattle that would be profitable in the dairy if their only winter shelter was the south side of a straw stack or a fence corner. The Jersey at least is not that kind of a cow; but she has shown that Nova Scotia, Province of Quebec and Province of Ontario, of Canada, with fair farmers' stabling, have produced some of the largest tests, and that with the thermometer twenty degrees below zero. She seems to do as well in Montreal as in Mobile; as well in Maine as in Maryland and Virginia. It is said, "Well, they may be good enough, but they are so small." Well, do you want a Jumbo? Among men David was small, Napoleon was small, but size is not always the true measure of value. A diamond is smaller than a cobblestone. I attended a fair last fall and on the grounds was a steer that by long feeding had been made to weigh over two thousand pounds. On the same grounds was a little Jersey cow, making within one-half ounce of four pounds of butter per day. More people went to see the fat ox at an admission fee than looked at and examined the marvelous dairy cow, free of cost; and I suppose one hundred coveted the possession of the fat ox where one coveted the cow. The one had neither pride of ancestry or hopes of posterity. From the womb of the latter may come many whose descendants shall enrich the land. But it is further said by some that they will wait; prices will be down. That may be. I for one hope so. Prices may go down to one-third what they are now, and yet we will make more out of Jerseys than a like investment will yield in any other legitimate business with which I am familiar. However, it is not to be considered within the probabilities that prices will grow much lower. Let us look at some statistics:

The American Jersey Cattle Club Herd Register was established in 1868. At its establishment, many animals of extreme age were entered; also many dead animals have been entered to complete pedigrees. At present, not far from 33,000 females appear as registered. Is it not fair to presume that about one hundred and twelve of these animals are dead or non-breeders at this time? leaving but, say, 17,000 living females. The number of milch cows in the United States, as per the census of 1880, was nearly 15,000,000. These cows produced in that year, 1,300,000,000 pounds of butter and 450,000,000 pounds of cheese.

The value of the butter, at 20 cents per pound, would be \$260,000,000; the value of the cheese, at 8 cents per pound, would be \$36,000,000; aggregate value, \$296,000,000.

The value of the butter produced exceeded the value of the cheese as seven to one, showing that it is the butter cow, rather than the cheese cow, that is in demand. We ask, "Is it not fair to presume that, as the merits of the Jersey cow come to be better understood, she will, within the next twenty-five years, displace and replace at least twenty-five per cent. of the scrub cows? To do this, the 15,000 Jerseys of to-day must increase to 8,000,000 in order to bear the same proportion to the 100,000,000 of residents of the United States in the year 1905. While prices on Jerseys may not rule fabulously high, yet we confidently believe that, for the next twenty-five years, the business of their breeding and development will prove both a pleasant and lucrative branch of agriculture. That for the family and for butter, the Jersey cow is pre-eminently the animal, I cannot doubt. I believe in the Hereford and Shorthorn for beef. In the scrub cow to help us on

to poverty; but as the choicest morsel to the eye, of all the bovine tribe, for milk for children and invalids, delicious butter and cheese for the table and for money in my pocket, the little Jersey cow, first, last and all the time.

DOES IT PAY THE FARMER TO GO TO MARKET?

By JOSEPH CARRELL, Jr., *Neshaminy, Bucks county, Pa.*

(Read at Hatboro' Institute.)

To this the answer will be almost universally, yes. We all have in our minds, no doubt, instances where farmers would be better off at home, but in the majority of cases it does pay the farmer to attend the Philadelphia markets. We are now writing for the farmer that lives fifteen to twenty miles from the city. Nearer to or farther off, the situation changes on account of the difference in hauling: farmers five to ten miles from the city can haul their manure and deliver their produce so much cheaper than those twenty-five to thirty miles distant. If it pays the farmer with twenty to thirty pounds of butter, two or three pair of chickens and five to six dozen of eggs per week, and other produce in proportion, the question is how to make it pay him better. Certainly one living so near one of the best markets in the United States does not live up to his opportunity if he does not deal with the consumer direct; in fact, he might as well live two hundred or three hundred miles away or even in the west where land is cheaper.

But to return to the question. As it does pay, how shall we make it pay better. I would not presume to lay down any arbitrary rule and in fact scarcely like to formulate a plan, as no doubt many of the audience are far more competent to advise both from experience and practice. The first requisite is good health and strength and no fear of work, as farming and marketing together is hard work. The farmer should own his farm and plan with the object in view, as it is not a question of a year, but of years. To carry it out successfully, it will depend on the fruits on the farm when purchased, but on almost every farm it will be a number of years before you have everything in complete running order. In regard to the size of the farm—we will suppose a farm of one hundred acres; on this you should keep ten to twelve cows and if possible make the butter at home, if you cannot ship the milk to the city, or, if you prefer (on account of distance to the station or dislike of getting out of bed at four o'clock in the morning), to the creamery and take as much butter out as you can market at a profit. If you have no aversion to marketing them, would keep during the year, about two hundred sheep; at no time more than one hundred, and these in the winter, depending on the increase of lambs for spring and summer marketing.

The main thing in marketing is always having something to market, not a surplus at one season and nothing at all except trifles at another, but plan ahead so as to have a constant succession. Poultry and eggs are very desirable, and if well attended to are very profitable. Pork and its products are necessary adjuncts and if attended to with foresight will furnish marketing in small pork, sausage, lard, hams, etc., for almost every week in the year. We do not wish to infringe on the

market gardener, but a farmer that attends the markets regularly should raise some vegetables. A small asparagus bed, about a fourth of an acre, will pay; a larger one might pay better. But we have to keep in view the work to be done and not pile up so much ahead of us that all of it will be half done and consequently at a loss. You should plant a large acreage of sweet corn, dividing it into five or six plantings—Early Crosby is the best for early, following with such kinds as your experience tells is the best. Lima beans are profitable if well taken care of—would plant a few Landreths' extra early peas, a few beans following with Stratagem peas about corn planting time. Also in the young orchard plant a row of cucumbers. Don't forget the potato crop; three to four acres are enough. Early Rose, Hebron, White Star and Mammoth Pearl are the most profitable. As soon as the second year's timothy is cut, plow and plant one to one and one-half acres of rutabagas for the sheep; if they will bring fifty cents per bushel sell them; drill in five or six rows of Landreths' extra early peas and a row or two of Valentine beans: they sell well at this season. Every farmer that markets should have plenty of apples, pears, cherries, peaches and grapes, not too many of each kind. If you attend to all these different varieties of fruits, vegetables, etc., as they should be, you will be a busy man.

We now have the stock for the market. The preparation is important. The fruits should be selected carefully, the meats well fattened, the poultry fat and properly dressed, the eggs fresh, in fact everything in the best and most presentable manner. Select a stall in a good market, in a neighborhood where the people are in moderate circumstances and do not all go to the seashore or the mountains in the summer time. Make it a point to be at your place of business on time, do not misrepresent anything, and you will find your customers coming week after week to be served, and as you establish a reputation for good prices, your neighbors who do not care to go to market will wish you to take their poultry, eggs, etc., which will add somewhat to your income if you choose to do it. In regard to the hay crop I should say that as we have the teams to farm with it will pay better to haul our surplus hay to the city rather than to the hay press. The farmers of this period have to face conditions that our fathers did not. Once the city markets were in a great measure ours, but numerous railroads, cheap lands in the west, and freights from the central west almost as cheap as from here to the city, make it impossible for us to cling to the old methods of farming and prosper, so as we have our choice, change our methods or change our business.

THE FARMER'S GARDEN.

By Col. J. A. STAHL, *York, Pa.*

(Read at Adams County Institute.)

Some one has written that a wicked man cannot make a garden, for the very labor is so virtuous and beautiful that it will rebuke him, and the things he produces will preach him sermons on morality and virtue.

Perhaps no acre of the farm pays half so well, in every way, as the

one set apart for the garden. It is very important that in selecting the location, you have it with a southern exposure. Let the soil be well drained and if possible be a sandy loam. Protected on the north by a line of trees, or, better still, a tight board fence five feet high. Let it be twice as long as broad, and make the horse do much of the work that usually falls to the lot of woman. Make your poultry yard so large that you will need no other inclosure around your garden plot. When spring-time comes have on your ground well-rotted manure, and then let the boys and horses of the farm do your spading. Cultivate thoroughly, and having made your plans during the winter, and gathered such seeds as you desire to plant, wait the first favorable days of late March and put in your extra early peas, and by the early days of June you will be able to place before good appetites one of the best vegetables grown.

Follow your early peas with cabbages and other hardy varieties of vegetables in April, the most important being a few rows of early potatoes. These should be covered pretty deeply to protect from frost.

After the first day of May, in this latitude it is safe to plant most of the vegetables and flowers that usually are grown in our soil.

Tomatoes, however, are not entirely safe from frost, until about the fifteenth of the month.

Extra Early Adams corn can be planted about the fifteenth of April; but the evergreen corns will rot in the ground and had best be delayed until later.

But I cannot in this short article enumerate all the fruits, flowers and vegetables that can be grown in a farmer's garden.

If, as supposed, you have a location that secures the early morning sun, and a fertile soil, and plant good seed your success depends largely upon how much attention you give to culture, cleanliness and the vagaries of the weather.

No well-regulated garden should exist without having a large bed of asparagus, and this should be planted on the extreme southern edge of the plot. About three rows through the piece will furnish enough for a large family twice a day, and leave a nice quantity to sell in the market, giving you as early as April, a very delightful dish to begin on, after a season of sour krouts and tough meats.

To prepare a bed for the plants is a simple thing for any farmer's boy, and to keep it producing for twenty years a simple process. An occasional top dressing of salt will pay a large interest on the investment. After selecting the ground for your bed, haul manure about six inches thick over the entire piece, and then plow under as deep as you can with a strong team. Put your ground in fine condition, draw your rows three feet apart, plant about two feet apart in the rows; be sure to cover the crowns a few inches, and then keep clean, and in a few years you will be compelled to say that it is the most profitable crop of the farm.

Asparagus when at its best should be cut at least twice a day, and if packed in dry sand, in a cool, dry cellar, will remain good for several days, if before using you place it in a vessel of cold water for a few hours.

In the arrangement of your planting, next to asparagus, put your early potatoes, then peas, for the crops can be harvested and a succession of sweet corn follow the same season. Then cabbage, early and late beans, egg plants, tomatoes, onions, salsify, beets, cucumbers,

etc., all to be worked by horse hoe or cultivator, saving a great deal of valuable time and reducing the labor of the farm woman.

I have neglected so far, to say anything about a very important matter, in connection with your garden. The board fence on your northern line you can utilize for hot beds.

These you can construct yourselves, after purchasing the sash for the glass, and in a few hours arrange for a variety of early plants.

Take fresh horse manure, make a bed three feet longer than your frame, about eighteen inches or two feet thick, sprinkle with hot water in between the layers of manure as you build up, place your frame upon it, then four inches of fine soil on the manure, put the sash in place, bank up manure on the outside of the frame, and let it remain a day or so before you plant your seeds. Be careful to open the sash in the heat of the day, but close in time in the evening. Now, with a little care each day and a cover in cold nights, you will secure a fine lot of early cabbage, beets and other plants that will repay all care and trouble.

You may say these are all useful articles to produce; but have you nothing to make the place beautiful—homelike—attractive—nothing for woman to do? Yes, and perhaps the only thing she ought to do. Make the whole place beautiful with flowers and shrubs between the hot beds and that part farmed by the men. Let there be a few rows of strawberries, raspberries, currants and blackberries, and then get some of the early spring flowers, and follow along all the season with what will suit your taste, from the earliest crocus to the latest chrysanthemum.

Let the yard of your home be embellished by the burning bush, bleeding heart, roses and ferns. The snow ball and lilac, sweet william, mignonette, lilies, dahlias, myrtle, and from your mountains get bitter sweet, trailing arbutus and the almost numberless little bloomers that peep out to get the morning dews of heaven, and you will have a place that in after years you will long for amid the struggles of life, and pleasantly remember when you go into the sear and yellow leaf.

DO CEREAL CROPS PAY?

By C. C. KEAN, *Franklin, Pa.*

(Read at Franklin Institute.)

No doubt there are many farmers who would answer this question in the negative, and think, too, that their position was iron-clad and could not be penetrated by any showing that might be produced by those who entertain different views upon the subject.

They might say that the farmer's life is one continual grind, year after year—always the same old story, all work and no play, all expense and no profit, and that many times they do not possess the necessary requirements to sustain life.

I admit that the picture thus presented looks dark. And dark indeed would be the farmer's existence while here upon earth if there was no reverse side to the drawing.

But when we turn the picture over and view the other side, I think

that we can see an abundance of sunlight for the farmer as well as for those who labor in some other way.

When we turn our eyes and behold the many farms upon which are erected fine houses, and barns and other buildings, with fields laid out in perfect order, in which may be seen horses, cattle, sheep, swine and poultry; in other fields, the cereal crops; wheat, rye, oats, buckwheat and corn stand, waving in the sunlight and nodding obedience to the tillers of the soil; and the orchards bearing many varieties of fruits, ready to drop their golden harvest into the farmer's lap, would seem to indicate that those nearest to the Creator and governed by Him who "withholdeth no good thing," might after all be the farmer.

The raising of cereal crops in this county for profit is attended with many considerations, many of which farmers should be familiar with.

Invariably the first consideration to successful farming is intelligence, and a disposition of mind to be pleased with the occupation, without which none should expect to accomplish much. By intelligence I do not mean a college graduate unless he possess good common sense as well. Yet it cannot be successfully denied, but that the schools and higher institutions of learning have elevated the methods of farming worn-out land scarcely capable of producing a healthy thistle or weed, up to an easy production of seventy-five bushels or more of shelled corn per acre.

The proper treatment of the soil is to bring it to a high state of cultivation and then maintain that condition of excellence, with a knowledge of when and how to cultivate the land, what crops are best suited to the different fields so that the crop may help feed the soil as well as the soil help feed the crop. For it is a well-known fact among successful farmers that while any of the fields of the farm would be capable of producing a large yield of any variety of grain that might be sown, yet there are varieties that are better adapted to some of the fields than others. This the skill and experience of the farmer must determine, and when no mistake is made, the best possible results will follow.

It might be well to know the possibilities of soil when under a high state of cultivation.

It is said that in China there is land that has been under constant tillage for a period of over 5,000 years with no apparent decrease in vitality and capable of producing vegetation, the value of which per acre is equal to \$1,000 in American money.

The capabilities of the soil of portions of this country are yet in its infancy, and I believe that the time may come when the fertile plains of the south and west will equal in value of vegetable production the most favored land of the flowery kingdom.

In a state of nature the soil of this (Venango) county is not equal to that of some other localities of the country that could be mentioned; but in some instances art can supply that which nature has left undone, as can be shown in many cases. Tests of the capability of the land in this county have often been made, and nearly always with flattering results. In this county forty-four bushels of first-class wheat have been produced from one acre of land; one hundred and fifty bushels of ears of corn per acre have often been raised; sixty bushels of buckwheat, and seventy-six bushels of oats per acre has also been raised in this county.

A field containing twelve acres of land not many miles from this city, produced at one cutting over forty-eight tons of prime timothy

hay. Another field of four acres produced sixteen tons in one season. From this showing who will say that the soil of Venango county, when under thorough cultivation will not pay fair returns.

As a rule farmers in this section of the country have been in the habit of raising all kinds of crops, not confining themselves to cereals only. In fact, the soil of this county, in some localities, is better adapted to the production of hay and root crops: this the farmer should determine for himself and be governed accordingly.

But the question is asked: "Does the raising of cereal crops pay in this county?" Probably the best answer to the question would be that the farmers have always raised those crops, and still continue to do so. To say that at least four generations of farmers who have lived and labored in this county, for no profit but just for the pleasure that the work afforded, would be casting reflection upon their intelligence, and that I do not propose to do, for I believe that the farmers of Venango county are fully abreast with the times, not only in practical but scientific farming as well.

Those who travel through the different sections of this county during the crop growing season of the year, cannot fail to observe the bountiful appearance that the eye beholds. Everywhere fields of wheat, rye, oats, buckwheat and corn waving in the sunlight and beckoning the farmers to thrust in the sickle and reap of some thirty, some sixty and even a hundred fold.

The soil of Venango county may not be as rich in grain producing qualities as the prairies of the west, but when it is known that it takes about two bushels of western grain to equal in value one bushel raised here, or, in other words, it takes one-half of the western grain to market the other half, I think that the farmers of this county have a strong point in their favor.

The worth of the grain that is raised here is not all the value that the farmers receive from its production. During the year that the grain is being produced, the farms are being improved, buildings erected, fences straightened, obstructions removed, homes beautified, while near-by towns and cities are built, school houses and churches dot the country everywhere, bridges span the creeks and rivers, and the iron horse proclaims one hundred dollars an acre for land that originally cost less than one dollar an acre.

I think that all the additional value accruing to the farm from improvements, the high proximity of school houses, churches, towns and cities, bridges and railroads, should be considered by the farmers as profits.

There are a large number of persons residing in this vicinity who are considered rich. That is, they own their farms and city property too, and can afford to enjoy all the luxuries they desire besides, much of which has been made by raising grain on the farm. Could farmers in any section desire more?

Another point I wish to make is that farmers here can have (if they choose) more leisure than any other class of men. Better health, too, caused probably by the pure air of their rural homes, and the fresh and delicious food to which a sharp appetite can always do justice.

Another item that should be considered while passing along is what time and labor brings to the farmer and his home.

It may be that he has been toiling for many a long year, and now that he is growing old, he can look over a productive farm with fine buildings, live stock of all kinds, with machinery for profit and for

pleasure. He owns it all, with probably a nice sum of money in the bank. In addition to this he is the father of a family of boys and girls. Noble boys and girls, worthy to adorn the farm and the old home, when the father and mother have retired across the river.

Now, farmers, what I have written is for your consideration. The thoughts that I have tried to present in this essay are for you, and I think that you will agree with me, that the raising of cereal crops in connection with the advantages that naturally come to the farm, pay as well in Venango county as in many other counties in this or any other state. I am aware that there may be those who will take exceptions to what I have written. They may say that the farmer's occupation and life is too highly colored, and that many farmers are not successful, and end their days at the foot of the ladder.

To such I would say, that all occupations and business enterprises are strewn with wrecks. Not that the occupation or business is at fault, but that the failures mostly come from those who are incapable of success in anything they undertake, unless it be death, and they are not always sure of that.

And now, ladies, permit me to address a word to you. I take it that your presence here at this agricultural meeting would indicate that if you are not farmers' wives, you would like to be. To preside over the farmer's home and what it contains, not only with the skill of your hands, but with the counsel of your wisdom and love as well, would be occupying a position well suited for those who are created only a little lower than the angels. The farmer's home may not be all sunshine, nor yet flowing with milk and honey, but with a fair queen to preside over his mansion and help to direct his thoughts, would be to sweeten toil, elevate the mind and smooth life's onward march to the better land.

FRUIT GROWING.

By W. M. BENNINGER, *Walnutport, Pa.*

(Read at Center Institute.)

Fruit growing has been successful in every part of Pennsylvania, wherever it has been properly conducted.

My object is simply to create a discussion on this subject which will point out, and undoubtedly correct, some of the errors that lead to failures.

Pennsylvania being a net work of railroads, together with an unlimited number of iron mining and manufacturing towns, more so than any other state in the Union, therefore the consumption of fruit is larger, and the market more easily reached than in any other state. I see no reason why Pennsylvania should not become the leading fruit growing state in the Union, and I am sure this will be so, especially, if all the counties make such solid efforts as Juniata county has made for the past several years.

The climate of Pennsylvania is so diversified on account of its general profile, that it has localities that are especially adapted to the

different kinds of fruit culture, and as a state it has advantage over all other states. We can grow fruit with profit for what it costs other states for freight and packing.

But I shall confine my remarks more exclusively to the culture of fruit.

I would recommend a three-year-old tree, which is generally from five to eight feet in height, and from three-fourth to one inch in diameter; this I recommend as the proper tree for planting; these trees should be lifted and shipped, properly boxed or packed, and roots well protected, after the ground is sufficiently thawed, when they will carry from here to any part in the Union.

These are annually shipped in car loads from nurseries to all the western states and territories, with perfect safety and success.

The prevailing opinion that a tree must and should be planted immediately after being lifted is, therefore, without foundation, as is also the opinion that nursery stock should be planted early in the season, but on the contrary it should not be planted until the ground has sufficient warmth, and in a fair condition for any other crop; the only necessity is to get the tree lifted before the buds are started, and properly cared for, but never forget an infallible principle, to transfer nursery stock from a cooler climate into a warmer, and never *vice versa*.

Immediately after the arrival of stock it should be planted or covered properly, with plenty of water, so as to swell the buds. The necessity of root pruning cannot be over-estimated; all damaged, together with some of the larger roots, should be clipped or cut back; the top should be pruned in proportion to the loss of root fibers.

The tree should be planted in good, rich, cultivated soil with hole sufficiently large so as to admit the roots freely, without crowding, and the heavier portion of the tree towards the southwest. If the ground is not well saturated with water, I would recommend a half a pailful of water to each tree, after the hole is partially filled with earth. Work the tree slightly up and down, so as to get the ground perfectly compact under and around the roots, fill the hole, press gently with feet and walk away with the assurance that thorough work merits reward, and may well compare with the beautiful lines by Bryant, who says:

"Come let us plant the apple tree;
Cleave the tough green sward with the spade;
Wide let its hollow bed be made;
Then gently lay the roots, and then
Sift the dark mould with kindly care,
And press it o'er them tenderly,
As round the sleeping infant's feet
We softly fold the cradle sheet;
So plant we the apple tree."

The orchard cannot be cultivated too much, and should be planted, with hoed crops for a term of ten years kept, clean from weeds throughout, as it is impossible to raise two crops at the same time and place, after which closely grazed, or lawn grass may be permitted, with frequent top dressing, and this must vary with vigor of the trees. Young trees should grow two or three feet yearly, and bearing ones from a foot and upwards.

Pruning depends more or less on taste; the prevailing custom of raising high tops is rather an inconvenience as compared with the low and spreading, as the latter affords better opportunities in gathering the fruit: pruning can be done during any portion of the year, and with

perfect success, and particularly, should the luxurious suckers be removed, as they are robbers of vitality. If an orchard is thus treated it will commence bearing a paying crop after the eighth year, after which the cultivation should not be so constant. Especial care should be taken not to disturb the roots more than is positively necessary.

The American market depends more on appearance than quality. It invariably pays to thin the fruit in case the tree has a tendency to overbearing, and to accomplish this satisfactorily requires judgment and decision; always remove the imperfect and clustered fruit, less on the sunny, than on the opposite side of the tree; fruit always colors better and increases in size, making after all just as many bushels, with a much advanced price. All early or summer apples should be picked, sorted into fancy firsts and seconds, and marketed at once.

Here honesty is one of the essentials to success, both as to making sales and to create a constant market. It is generally advantageous to sell the fancy and first quality only, realizing more for the two grades than is generally done by a combination of all.

The winter apple should be carefully picked, nicely sorted, as before, packed in clean barrels, and at once stored away in a cool cellar or a place of even temperature. In order to realize the best and highest price, I would advise to keep posted, and watch the fruit market in different localities and exercise good judgment in their disposal.

A rule followed by many successful fruit growers, is to sell at first opportunity that offers a fair price, thereby saving all trouble of re-packing, etc. If the surplus of inferior fruit does not pay by turning into cider or vinegar, there is another plan that will certainly pay, and of which I have personal experience. The value of apples or pomace feed to stock is, as yet, too much ignored; they do not only increase the flow of milk, but also produces flesh and fat, and this is more especially true to pomace. My cattle never done better then when I fed them all the pomace they would eat: some ate with a relish one bushel a day.

Apples. I would recommend the following for early: Red Astrachan, Benninger, Early Harvest, Fall Pippin, Maiden Blush, Rambo, and Gravenstine, Winter, Baldwin, Smith, Cider, Ben Davis, King, Smoke-house and in some localities Fallwater; for profit I would recommend, Baldwin, Smith's Cider and Ben Davis only.

The profits of an apple orchard, compared with ordinary farming, are enormous. A good orchard will bear fifteen bushels per tree; allowing fifty trees per acre, thirty by thirty feet, would yield seven hundred and fifty bushels; at one dollar per bushel, would net seven hundred and fifty dollars per acre.

How long will it take the ordinary farmer to see and experience this? I would advise to touch new varieties lightly, as they are few and far between that give satisfaction and prove a valuable acquisition to the already well-tried sorts.

The varieties that give good satisfaction in a locality are the kinds in which to place confidence.

Pears. I would recommend, Bartlett, Clapps, b. d. Anjoue, Seckle and Shelden. I will omit plum, cherry and apricots, etc.

Quinces. I would recommend, Orange only, and they should be grown on rich soil and require special care; they are very profitable.

Pennsylvania is fast becoming one of the leading peach-growing states, as the south is retiring from the business. Brother Hale, says: They are starving their orchards, and there is no such thing as yel-

lows. Mr. Hale had the fortune of clearing twenty-five thousand dollars on his peach orchards, way up in little Connecticut, years ago; he also said that two years ago he had a committee of expert fruit growers and nurserymen visit his orchard who condemned several rows, as having the yellows; he did not believe it and did not root them out but gave them a severe pruning, and a double ration of potash and raw bone, broad cast, and a thorough cultivation, and the next year he sold the fruit from the same trees for five dollars a basket, and they are now his best trees.

I hope you will pardon me for quoting so much from Mr. Hale, but I consider him the most successful peach and fruit grower in the country. I had the pleasure of meeting him in New York city, at the meeting of the Nurserymen's Association of America, where these facts were solicited personally.

I also had the pleasure of speaking from the same platform, and immediately after him at the Centre Hall picnic.

Peach trees should not be more than one year old; they have more fibrous roots; the roots should be closely pruned, and the top cut back. They should be planted sixteen feet square in well cultivated and good rich soil. I prefer gravel soil, natural drainage, and northern exposure; and the planting should in all cases be done in the spring, as soon as the soil is dry and warm enough to plant other crops.

The ground should be plowed deep and well worked, and fertilized with potash and raw bone if good results are to be expected; all small lots, unless car loads, should be ordered in boxes as the freight is less per one hundred pounds and they will in all cases reach their destination in better condition, and can be better cared for after arrival.

A peach tree should be pruned every year; the best time is when the trees are in blossom, as you can prune and thin at the same time.

(This I also have from Mr. Hale.)

The thinning and sorting should be the same as already said in the fore part of my remarks.

I would recommend such varieties as have been well tested, and do well in your vicinity. Let the new and fancy varieties be tested at the experiment stations and agricultural colleges.

The following are well tested and reliable varieties, Mountain Rose, Early Crawford, Stump the World, Old Mixon Free, Late Crawford, Smock and Salway.

I am of the opinion that the early varieties will be more in demand in the future, as they are better in quality, and more sure of a crop in all seasons.

In conclusion, I must not omit the small fruits, such as strawberries, raspberries, blackberries and currants, for upon these depends the health of the farmer. These occupying a season of ripening from June till almost Fall, supply the farmer's table with a medicine far more valuable than all drug stores combined. And not only this but they are easily and successfully cultivated, and yield a larger return than any crops raised.

First in order comes the strawberry, ripening in June, beautiful, wholesome and appetizing.

Plant in March, April, May, September and October, on good soil well manured, or what is preferable, plenty of hard wood ashes or bone dust; for field culture, plant four feet by fifteen inches, in rows.

The following are good varieties: Crescent, Sharpless, Wilson, Albany and the Jessie.

Next in order come the luscious raspberries, which if properly cultivated are also profitable.

Plant on strong ground, with rotted manure, cultivate freely, rows seven feet apart by three feet in row, pick off canes when two and one half feet high to make them stocky and self-supporting; cut out old wood each year. The best varieties are Cuthbert, Shaffers, Colossal, Gregg, Mammoth Cluster and Ohio.

Blackberries are next in order; and who does not know of the exhilarating effects they produce, seasoned with plenty of sugar and milk. This crop is receiving more attention of late, and present indications are that the blackberry has a bright future.

Cultivation and planting similar to raspberries, with the exception of more shallow. The best varieties are Early Harvest, Kittanning, Erie, Snyder, Taylor, Wilson, Junior.

The currant, is the most neglected of our fruits, and I doubt whether this fruit if properly cultivated, would not rank second in profits. Because the season extends over such a long period, a good market is generally found for green currants, which sell from seven to ten cents per box, with stems.

Another advantage with this fruit is, it is a much better keeper, as it hangs for quite a long time after being ripe. The reason of its neglect is on account of the currant worm, but white powdered hellebore is sure death.

Plant four feet, each way in rows, in well enriched ground, with plenty of manure, cut out old wood, and thin enough so that each shoot has a chance to grow, and thus produce perfect clusters.

The best varieties are Cherry, Fay's Prolific and La Versailles. I reluctantly omit so many good varieties, but time may prove more valuable, by a discussion of these several subjects, and I want you all to feel at liberty to interrogate me on any subject pertaining to fruits.

CARE OF FARM MACHINERY.

By JOHN A. WARDEN, *Mt. Pleasant, Pa.*

(Read at Mt. Pleasant Institute.)

We are living in a time that demands strict economy on the part of those that till the soil for a livelihood. We are beset with many discouragements owing to the reduced price of our produce, so that it is by economic effort alone that we can make the debit and credit columns in our ledgers tally.

Since economy is demanded of us, in what shall we begin? To my mind, it should be made, first of all, in a judicious use and care of the instruments with which we perform our labor. It is not my purpose to advance any scientific theories; but, in a plain, practical common sense way, show the importance of taking the best care of our implements, both in the using and during their resting season.

Every implement that the farmer has is gotten for a special purpose and in order to obtain the best results, it must be in the best possible order and handled by a competent operator.

The first great principle in the purchasing of all implements or

machinery, whether for farm use or for the multitude of other purposes for which mechanical instruments are used, is to buy none but the very best, both in kind and quality. The implements of the farmer, some suppose, consist only of wagons, plows, harrows and the like; but to these must be added reaping machines, mowers, grain drills and binders. The tools of the farmer—picks, shovels, forks, rakes and some carpenter and blacksmith tools—all properly come under the head of farm implements.

In making his purchases, it may be necessary for the farmer to make a study of the character of the soil, whether light or heavy, in which he intends to work his implement, or of the ground, whether hilly or level for a machine, so as not to purchase either implement or machine heavier than necessary to do the work. The principal part of power that is used in farming is either horse power or manual labor, and when it is the former, the good care of his horses should be incentive enough to the farmer to purchase light, easy running machinery, and when it is the latter, he will find that the laborer will accomplish more, and do his work better and more cheerfully if the tool or implement is light and graceful. More than that, he will be apt to take better care of it.

Care in the using of an implement or machine is of much importance, as a careless or ignorant operator may, in a very brief period of time, allow a piece of machinery to become almost useless for the want of a few drops of oil at the proper time; or some part may be displaced by the loosening of a bolt which he fails to detect, thus allowing wear and tear where there should be none. For any implement to be in perfect order every part must be in its proper position, thus avoiding increased friction and also heavier draught or power. So that much depends on the operator.

He who handles a machine is so closely allied to the machine itself, that the one is practically useless without the other; so that we must not only provide the best machinery, but employ competent and careful laborers, thus avoiding unnecessary wear and breakage at the hands of an incompetent workman.

The season of rest for farm implements is the time that is very necessary to give them proper care and attention. There is no other occupation in which man is engaged, that his instruments of livelihood have as much resting time as those of the farmer. Most of them, at a safe estimate, rest eleven-twelfths of the time, while others are not in actual operation one-fiftieth part of the year.

Every farmer should have a convenient implement house, easy of access and roomy enough to hold all implements without piling them one on the other, so that one can be taken out without much trouble and also replaced at the end of its season.

Put each away carefully. Sometimes it is convenient to put an implement away that needs some repairs, such as the farmer can make himself. He can do this on wet days and during the winter season; but, by no means allow it to stand out of repair until wanted for use.

Every farmer should have some tools, carpenter and blacksmith; he does not need an entire outfit of either, still there are some of both that are not only convenient to have, but are also necessary. These, as well as other implements of the farm, should be kept in the very best order possible, and ready for service at any time.

Some things for farmers to bear in mind are that paint preserves

woodwork; that rust softens iron or steel; that tools, such as shovels and picks, left where they were last used, are sometimes hard to find; that cheap machinery is dear at any price, and last but not least the old motto that has graced the walls of our school houses for many a day: "Have a place for everything and everything in its place." There is many a farmer who, had he heeded this injunction, might still be the happy possessor of tools that have long since been thrown aside as useless, because he never had a proper place to keep them consequently, never had them put away.

THE SILO.

By L. DENNING *Clearfield Pa.*

(Read at Gramplan Hill Institute.)

Francis Morris of Maryland, in 1876, was the first to build a silo in this country; in 1880, there were but six.

Ensilage at first met with a persistent opposition from men not only familiar with the practice of the farm, but also from those who make the science of agriculture their professional calling, and yet, step by step, and in the face of the most determined opposition, this food for the dairy and stock farm has made its way to public favor steadily and rapidly, as shown by the increase of silos which last year numbered over ten thousand. It is true there was some poor ensilage, and several failures where "any way to get it done," and "almost right," was made to do instead of just right.

COST.

The cost of a silo it is impossible to tell without all the incidentals and conditions of building, but it may be safely said that it varies from about fifty cents per ton for the cheapest, to one dollar and fifty cents for the more expensive. Its cheapness, however, is apparent for the outlay for storage. One ton of ensilage occupies about ninety-three cubic feet, a ton of hay, five hundred feet.

The facts concerning silos are few and simple, and in no way difficult to understand. We already know that any kind of green crop can be preserved in a silo. But why does it keep? Is it because of heavy pressure? No: because it keeps good without pressure. Is it because it has been well tramped (as they used to with a horse)? No. But it is simply because the silage has been allowed to heat up to the temperature of one hundred and twenty-five to one hundred and forty degrees, and thereafter remains in an air-tight non-conducting enclosure.

PRESERVING FODDER CORN.

Many columns and pages have been written to prove that dry fodder corn is equally as good out of the silo as in it: that ensilage has no more nutriment than it had before going into the silo. These statements hardly settle the case. We do not put corn into the silo to gain nutriment but to preserve from waste the nutriment already in it.

YIELD OF ENSILAGE CORN.

A fair yield would be, fifteen tons or thirty thousand pounds per acre. Fifty pounds per day for a season of two hundred days, would be ten thousand pounds or five tons. At this rate one acre would produce enough to feed three cows, the entire season of two hundred days. So you see that an acre of fodder corn of fifteen tons, green weight, would, if well preserved in the silo, keep one cow six hundred days, giving her fifty pounds per day, and that one acre of hay that would produce two tons of well-cured hay, would feed one cow one hundred and sixty days giving her twenty-five pounds per day, the feeding value being three and three-fourths times greater in the acre of ensilage than in the acre of hay.

DOES THE ENSILAGE AND SILO PAY.

Yes, the ensilage feed does pay; it pays in many ways. In the furnishing a food for the cow which is largely similar to the pasturage grasses of June and October. It prepares the farmer to laugh at the drouth. It enables him to keep twice or three times the amount of stock that he formerly could, and he can keep his steers growing almost or quite as fast during the winter months as in the summer.

FEEDING ENSILAGE.

It is best to feed about six pounds of cut hay to fifty pounds of ensilage, and if you feed grain, feed different kinds, so as to take a balanced ration of albuminoids, carbo-hydrates and fat.

But, if you intend to keep your cattle with only the shelter derived from the warm side of a wire fence, don't build a silo.

THE TRUCK GARDEN.

By J. P. WATTS.

(Read at Gramplan Hill Institute.)

In a general way, I think we can safely say, that unless the soil and climate are naturally adapted to the growth of that which we wish to produce, we cannot make a general success of the crop.

Nor can we be successful financially, though we have the soil and climate, and grow a good crop, if we have not a fair market in which to dispose of that crop. So the question first to be considered is, have we soil and climate adapted to the growth of berries and vegetables? I think we have, and if I wished to convince any one of the adaptability of these to the growth of berries, I think I could do no better than to induce him to take a trip through some of our old choppings, right in the height of berry season. If this had been preceded by a visit to some of the old meadows in strawberry season, I think he would agree with me, but would probably go on to say, that there would be no use of cultivating any because of the abundance of the natural fruit; and this is, I think, one of the reasons why there are not more cultivated. People reason that the natural fruit costs nothing. It may not cost

those who live right along side of it much, but as a rule, several miles are traveled before reaching the berries, and then often none are gotten, because others were ahead.

If the time spent in lying awake at nights, watching for three or four o'clock so as to get an early start, early enough to be ahead of all others, and the time spent in going to and from the berry field, devoted to putting this knowledge into practice the result would be more satisfactory.

If there is anything Clearfield county farmers should be thankful for it seems to me that thing is a good market for almost everything that we can produce. This, of course, is due to our large coal and lumber interests; interests which bring to our county thousands of dollars daily. I wish I could tell you how many berries the people of our county would use, were they brought right to their doors, at ten cents per quart, which is a good price.

I do know that it is away up in the thousands of bushels; if you think not, just put out an acre or two, give them good cultivation, the best you knew how; advertise a little, not much, as you will have to devote too much time to replying that orders are away ahead of your supply. The people of our county will have fruit of some kind but prefer the home raised. When these cannot be had they resort to the foreign raised apricots, prunes, peaches, raisins, etc.

Most authorities teach that the use of fruit is conducive to health. This too notwithstanding the small boy's verdict who had eaten the green apple. If this be true we are to a certain extent responsible for the good health of our neighbors. They are willing to pay us a good round price for our medicine, and we should be willing to supply them. I know they would rather take, our rhubarb than that furnished by the doctors.

Now a little talk about vegetables. There is only one reason why we should not produce enough vegetables to supply the demands of our county and have some to ship away. That reason is that it would somewhat spoil the sales of our brother farmers in Jersey, Maryland, Michigan and other places. As they are rather distant relatives, I think this reason would not keep many from engaging in the business, providing they thought that they could be successful financially. A few weeks ago, I hoped to get a pretty full account of all the vegetables shipped to one of our mining towns and from that make a rough estimate of what is shipped to our county. But I was disappointed. However I found that this town alone had received fifty full car loads of potatoes last year, besides those shipped in smaller quantities.

Who shall engage in this business? We often hear remarks something like this:—"Yes, we will have to quit general farming and go to trucking." Were they all to put this into practice, I am afraid there would be a good many disappointments. Not that I think there is no profit in the business, but because only a very few are calculated to make a success at market gardening. This has been proven time and again. The reason of this is that the tendency of almost all is to procrastinate, and this will not do in this pursuit. When the time comes for planting it must be done without delay; so with the cultivating, gathering and marketing. The next reason why more do not succeed, is because they are not thorough enough, and have not a very large supply of patience and firmness. Their wives would do much better in this respect.

Unless a person contemplating raising truck can make up his

mind to cultivate his crops after every rain, just so soon as the ground is dry enough, he would better not engage in that business. If this repeated cultivating is practiced, a crop will seldom be an entire failure because of dry weather. The reason is that the loose soil acts as a mulch.

You have probably noticed that the surface of a track made by a horse or other heavy animal, is almost always moist; although the surrounding ground is dry, and though the sun be shining, and a hot dry breeze be passing over the ground; this would certainly make the track dry in a few minutes, were it not supplied from beneath. The reason is, that the soil has been firmly pressed together, makes it act on the principle of an ordinary ink pad. If the track be covered with an inch or two of loose earth, the sun and wind cannot get at the moisture to carry it away, and the moisture cannot get out because the soil is too loose to allow it to come to the surface. By making use of this knowledge, we can make better use of a part of the great amount of water which enters the soil during winter and early spring.

ECONOMY ON THE FARM.

By Hon. W. S. WALDRON, *Evans City, Pa.*

(Read at Renfrew, Butler County, Institute.)

Next to thorough draining, the great lack, in our farming, is a proper economy in the application of manures, and fertilizers. By manures, we mean that produced on the farm; and by fertilizers, guano, phosphates and the like on the market. No farmer should buy fertilizers, until he saves and applies his manures, and never on credit, with the expectation of realizing a crop, to reimburse him for the outlay.

From extensive observation we conclude that not one farmer in one hundred makes the most of his manures.

It is not economy to permit the liquid manure from stable and barnyard to run to waste on the public highway, and on fields where it is not needed.

The barn-yard should have a cesspool, and a cistern with drains to conduct the liquids into it; near it should be hauled muck, leaves, straw, and any kind of vegetable matter when the team and hired man are not otherwise employed on the farm.

Let the contents of the cesspool be poured on to it. When this heap is thoroughly saturated, fork it over, haul it away, and bring new material. Don't pay out one dollar for artificial fertilizers until you have made the most of this valuable matter right at your hand.

Some soils may need chemical treatment, and especially run down or non-productive lands. The question is whether it is better for the individual farmer, to buy the raw material and compound his fertilizers, or buy them already mixed in the form of ammoniated superphosphates, complete fertilizers, and other special fertilizers, for different corps and soils, prepared by formulas of one kind or another.

You are aware that the analyses of fertilizers offered for sale in the market shows the quantities of nitrogen, phosphoric acid, and potash

and the forms of combination of these ingredients, and the intelligent farmer should be able to mix, and apply them to the soil.

Finally on this point we conclude it very bad economy to expend two dollars for artificial fertilizers, to add an additional dollar's worth of agricultural products to farm.

The amount of capital now invested in farm implements in the United States, by a reasonable estimate, exceeds nine hundred million dollars. No argument, therefore, is needed to show the importance of its being well invested and proper care taken of it.

The difference in economy between working at a disadvantage with poor tools, and the use of modern appliances to lighten labor and save time, is clear to every farmer of even ordinary comprehension. Then in the purchase of farm machinery, buy the best; it will be the cheapest in the end. Buy it early in the season, that you may be able to commence in proper time, to drive your work. But never let the farm work drive you. On every well-regulated farm, a tool house is an obvious necessity; and all the tools and implements of the farm, should be kept there, and immediately returned after use. But farmers are notoriously negligent. A valuable mowing machine is not uncommonly left, after its work for the season is done under a shade tree in the field, or by the roadside, uncleaned and unoiled, where it is liable to rust, and be injured by neglect far more than the wear and tear of a whole season's usage. Is this economy? I should say not.

A rotation and variety of crops are the true theory on the farm, and should be carried out practically to make the farm pay. The theory of rotation is that the soil contains, in a greater or less degree, all the elements of plant food, and that each crop extracts its own peculiar elements and no other. This is undoubtedly true.

Agricultural chemistry shows by analysis what elements are extracted by each crop. For instance, it is shown by the result of various chemical analyses that red clover, is composed principally of potash, lime and carbonic acid, and that the grain of wheat, consists, for the most part, of phosphoric acid and potash, and the straw of silicas.

Potatoes are composed principally, of potash, carbonic acid, and phosphoric acid; turnips, of potash, lime, carbonic and sulphuric acids; peas consist principally of potash, and phosphate of lime, the rye of phosphate of lime and potash, the straw of potash and silica.

This is perhaps too scientific for the ordinary scholar. But the intelligent farmer will always be aided by a knowledge of the principal elements of the crops he cultivates, of the soil on which he cultivates them, and the manures applied, but the rain and dew, the air and the sunshine which he cannot regulate, will often change his best planned results.

Permit me to offer a few thoughts on the planting of potatoes. There is scarcely any need of urging the cultivation of potatoes, as the farmer wants these himself and will have them, even if they should cost him one dollar a bushel or more.

In planting early varieties, select warm mellow land, a sandy or gravelly loam, manure well, plant as soon as the weather will permit in April, plant more liberally of the early varieties than is usually done as they will be matured before the summer drouth sets in; later varieties can be planted in May; have good seed and cultivate thoroughly, and let no weeds stand either in or between the rows, then you can safely trust to Providence for a crop.

Indian corn should be more extensively grown, even in this locality, as it is indispensable as food for all live stock on the farm, even the family not excepted.

Wheat and rye may be cultivated with some profit. Rye I would grow on the farm for the straw; and you are almost certain of a good crop yearly.

Oats is a crop the farmer cannot afford to be without, and at present prices pays well.

It is said there can be no "best farming," without a liberal culture of roots, and we admit the economy of root culture on rich soil.

But in this locality, we consider grass the foundation for good farming; without grass, no live stock; no live stock, no manure; no manure, no productive soil; no productive soil, no profit in farming.

The man who succeeds in growing the greatest number of blades of grass to the acre is the successful farmer.

On a farm of one hundred acres of well cultivated land, there should be produced annually not less than sixty tons of good hay, of which forty tons ought to be fed on the farm to maintain the fertility of the soil.

No farm can be considered properly cultivated without its clover-fields; valuable as clover may be for both hay and pasture, we consider its greatest value to be as an improver of the soil. As to the most profitable breed of cattle, stockmen differ; undoubtedly, Shorthorns take the lead as feeders. For the dairy the Ayrshires and Holsteins, and for rich milk and cream, the Jersey stands at the head.

A cross of the Ayrshire with the Shorthorn, is highly recommended as combining to a greater extent than any other cross, and in yielding a greater quantity of good milk, and beef in proportion to the food consumed or cost of keeping.

We think it very poor economy for the farmer to sell all his calves, when but a few weeks old to the butcher, for five or six dollars; it is much better to keep them to they are three years old, for they will not only enrich your farm, but will increase your bank account.

In breeding horses for farm use and market, we should look to speed, weight or draught, and endurance. Heavy draught horses are doubtless the most profitable because they bring the highest prices in the city market, and cost but little if any more to feed to raise them. We should also breed some roadsters, or what is called general-purpose horses. But do not believe it economy for the farmer to waste much time with race horses and trotters.

Hogs fill an important place in our place of mixed husbandry. But few farmers raise as much pork as they might with profit.

In the first place there is no use in feeding a long-thin, slab-sided breed of pigs.

The question is, what are the best breeds? There are several good breeds. The "Chester Whites," "Berkshire," "Poland," and "Yorkshire." A cross of the "Berkshire" with the "Yorkshire," combines two qualities flesh or lean in the "Berkshire," and fat in the "Yorkshire," and make light feeders; they will grow and do well in summer on clover, with very little grain; would advise in the selection of stock for breeding and to avoid gross feeders. Have your sows to farrow in March and September, as it makes less trouble in rearing the pigs; with care and attention no other animal will yield so much, in so short a time, with such a small outlay of capital.

The sheep—There is no stock a farmer can turn his money in quicker

than in sheep. The question is asked, what breed is the best, or most profitable on the farm? I would say you must be governed by the distance from railroad and large cities.

The "Southdown" for both mutton and fleece are claimed to be fully equal to any other breed; they are hardy and mature young, and are ready for the butcher from three months to five years old; therefore, taking every thing into consideration, conclude they are the most profitable and best suited to the farmers of this locality.

Finally, in conclusion, would say to my brother farmers take courage and adopt system in your farm work, and the soil will yield a generous return for your labor; strive to have something to sell on the farm for cash every month in the year, and do a little book-keeping.

We can scarcely appreciate the advantages we have over the farmers of forty or fifty years ago, when I first began to swing the scythe and mow. With the modern appliances and intelligence of to-day we are enabled to leave our farms richer and more productive to those who are to follow us.

CARP CULTURE.

By Rev. L. A. WICKEY, Eschol, Pa.

(Read at New Bloomfield Institute.)

The present article is intended to give a brief description and account of a well known fish of Europe called carp: its nature, way of living, and its adaptability to the waters, and the wants of our own country, for it certainly is a most valuable fish.

The carp, *cyprinus carpio*, of the family, *cyprinidae*, has a toothless mouth, thick lips and four barbels on the upper jaw. In place of the usual teeth of the mouth there are said to be a number of stout teeth on the pharyngeal bones, which are arranged in three rows. It has one single dorsal, which is longer than the anal. Both these fins have at their origin, on the interior edge, a strong ray, which is serrated in a downward direction, the scales have an entire edge, and the body is compressed on the sides. The general color of the back and sides is a dark olive brown, the abdomen often of a whitish yellow or orange tint. The coloring depends, as with all fishes, partly on the age and season, partly upon the water, the soil, and also upon the food of the fish.

It is supposed that the carp was originally introduced into Europe from central Asia, many centuries ago; and is now common in most of the large rivers; in some parts of Europe, principally Bohemia, Austria, southern, central and northern Germany, it has become domesticated. It is said to have been brought or imported into England in the year 1504. In Austria, which has the most extensive carp fisheries in Europe, the culture of carp can be traced as far back as the year 1227. The Emperor Charles IV., of Germany in granting certain privileges, favored the establishment of ponds in his dominions, and the monks were especially assiduous in the culture of fish in ponds. In the beginning of fourteenth century Bohemia had its first large carp pond. The manor of Wittingan suffered greatly from the calamities of the

thirty years war, and with it also its fish culture. The latter only recovered the effects of it after passing, together with the large estate of a rich monastery of the same name, in the year 1670, into the possession of princes of Swarzenberg.

These artificial ponds comprise an area of no less than twenty thousand acres, and the proceeds amount to no less than five hundred thousand pounds of carp per annum. These carp are divided into three distinct groups.

First.—*Cyprinus carpio communis*, the scale carp; with regular concentrically arranged scales, being, in fact the original species improved.

Second.—*Cyprinus carpio specularis*, the mirror carp; thus named because of its extraordinary large scales which run along the sides in three or four rows, the rest of the body being bare.

Third.—*Cyprinus carpio coriaceus sive nudus*, the leather carp; which has on the back either only a few scales or none at all, and possessed a thick soft skin, with velvety touch.

The two last named are distinguished from the original form by a shorter and stout, but more fleshy, body. It is hard to determine which of the three species is the most suitable for culture. There are places where only scale carp are bred and mirror carp are not valued, as there is no demand for any but the scale carp in the markets as, for instance, in Bohemia, in the above mentioned domain, Wittingan. Again, in other districts, as in parts of Bavaria and Saxony, etc., for the same reason mirror carp and leather only are bred. There is in fact no sufficient reason for making any distinction among the foregoing varieties, for if they are genuine types of their respective species, they are an excellent and desirable fish.

It has been asserted at times that the scale carp is better adapted for transportation than either the mirror or leather carp, by reason of its scales, which would, as is supposed, protect it more completely against attack, in the ponds; the mirror carp having but few and the leather carp no scales (this assertion is however not well grounded). For the reason that in transportation scales are frequently torn off and if this occurs only in part ulceration will ensue, and the fish will die; on the contrary the leather carp, which like the frog, is without covering, will bear a great deal more hard usage and injury, whether young or old, than the scale carp. I know of personal experience of an instance in which a six and three-fourths pounds mirror carp was left fall on the edge of a vessel causing a wound seven-eighth of an inch deep on the back; this was supposed to be a mortal wound, but at the earnest solicitation of Rev. Hamilton and others, the fish was returned to the pond, and in about six weeks later taken again, the wound entirely healed over, although the cavity was not quite filled up. The carp will sometimes cross with some related species, *Cyprinidae*, and in consequence hybrids have been engendered, which sometimes resemble the genuine carp so fully that it is often difficult for the student as well as for the culturist and fisherman to immediately recognize them. Such fish are valueless as food, on account of their inferior and bony flesh. Hessel says he has taken the trouble to feed these hybrids for three years in order to try their fitness for the table, but found their flesh exceedingly poor and very bony, and could be compared by means to our common carp.

The carp is partial to stagnant waters, or such as have not too swift current with a loamy, muddy bottom and deep places covered with

vegetation. It inhabits most of the rivers of Europe, and even salt waters seem to agree with them very well. In the Black Sea it is said to have been taken where its weight often amounts to from fifteen to twenty pounds. It is an advantage that the carp is able to live in water where other fishes could not possibly exist, in the pools of bog meadows from which it is evident that any one having a place where they can collect the water may have a carp pond, and cultivate his own fish. We must however not infer that the best locality for a carp pond is in such a place. The presence of too much mud and vegetable matter producing humid acid is unfavorable to the well being of the carp. The carp lives upon vegetable food as well as upon worms and larvæ of aquatic or water insects, which it turns up from the mud with the head. It is easily satisfied, and will eat the offal of the kitchen, slaughter-house, etc.

In central Europe the carp will, at the beginning of the cold season, seek deeper water, and invariably in groups of fifty to one hundred, will congregate in what we call kettles, in which they pass the winter, with their heads together in concentric circles, and without partaking of a particle of food from the beginning of October to March, and even in some instances later. There are some who claim that the carp will take food in winter. But I never yet knew a carp to take hold of food in the cold season. It is a most striking fact that the carp takes no food during winter, yet he will not diminish in weight. On the Saturday preceding Christmas, 1889, I caught a carp called Ben. Harrison, and carefully weighing him found that he weighed five and one-half pounds; on or about May first, 1890, I weighed the same fish again, and found he still weighed five and one-half pounds, from which fact we readily learn that the carp does not grow during the winter. Warmth alone will promote growth. It is said to grow only in months of May, June, July and August, at least in this latitude, July seems to be the most favorable month for its growth.

I think feeding carp should not be resorted to, except in small ponds with a small stream.

The spawning season of the carp begins about the middle of May. In ponds having a warm situation, and sheltered from cold winds, it continues, in some countries until August. This latter spawn is however not so good to breed from. As the fish grow but little during the fall, and are likely to be dwarfed, the spawning of the individual fish does not take place all at once. Days and weeks sometimes pass, before it surrenders the last egg to the care of nature. Cold rainy weather during the spawning period, often interrupts the work, but on the return of fair weather the work is again resumed. Wet cold summers are no more profitable to the culturist of carp than to the agriculturist. The number of eggs in the carp is very great, which explains its wonderful increase in the natural stream. A carp weighing from four to five pounds is said to contain from four to five hundred thousand eggs.

Some days before spawning the fish show an increased activity; they rise more often from depths below to the surface. Two or three of the male fish keep near the female; the latter swims more swiftly on a warm, sunny morning, keeping mostly close to the surface, followed by the males; this is called running spawning, and happens oftener in fine warm weather than in windy and rainy weather. The female prefers spots which are overgrown with grasses and other aquatic or water plants. The male fishes will follow the edge of the

water or as near as the diminishing depth will permit them. They lose much of their timidity. They lash the water in a lively manner. With their tails twisting the posterior portion of the body energetically, and shooting through the water near its surface with short, tremulous movements of the fins, and in groups of two or three males to one female fish, forming an almost compact mass. This is the time when the female drops her eggs which are immediately impregnated by the male. It seems to require days and even weeks before the female gives up its last egg. *Festuca fluitans*, generally known by the name of water grass, is probably the best grass for spawning ground, as most eggs which have nothing to cling to are lost. In warm weather the eggs will develop themselves quickly. As early as the fifth and sixth day, the first traces of dusky spots, the eyes, will be visible; about the twelfth or at the latest the sixteenth day the little embryo fish will break through its envelope. This rapid development takes place only in shallow and well-warmed ponds, or in such as were expressly constructed, and called breeding ponds. It seems to be a fact that in from three to five days the fish have absorbed the yolks and begin to seek their food. The carp, already stated, prefers stagnant or slowly-running water, with muddy bottom, and feeds on vegetable and animal food, aquatic plants, seeds, worms and larvæ of water insects; it is therefore no fish of prey, it does not attack other fish, it has no teeth in its mouth, only in its throat, and on account of its harmlessness is therefore an excellent fish for the culturist, as well as for stocking rivers and lakes.

Third. Its growth and size.

Its growth differs according as the fish inhabits cold or warm water, lake or pond, finding food therein or being fed. And the quality of the soil is an additional factor, whether muddy or stony, and again if the pond be overstocked they will not grow so rapidly. In rivers and lakes it grows larger although the same fish. It escapes the pursuit of man. The normal weight which a carp may attain to in three years, whether it be scale, mirror or leather carp, is an average of from three to three and one-fourth pounds; that is a fish which has lived two summers, consequently eighteen months old, will weigh two and three-fourth to three and one-fourth pounds, the year following. Carp may reach a very advanced age as it is said that in Austria there are specimens one hundred and forty years old.

Its increase in length only continues up to a certain age. But its circumference may still increase up to its thirty-fifth year. Rudolph Hessel, says: "I have seen, some common carp in southern part of Europe, in the lowlands of Hungary, Servia, Croatia, Wallachia, as also Moldavia, which weighed from thirty to forty pounds, and measured nearly three and one-half feet long, and two and three-fourth feet in circumference;" he further states that during the Crimean war, 1853, a French engineer officer, stationed at Widdin on the Danube, in Turkey, killed a carp by a bullet shot, some distance below the city; this fish weighed sixty-seven pounds, and that he had some of its scales in his possession of which each had a diameter of two and one-half inches, supposed to be only twenty-four years old. It is a well-known fact that two large carp weighing from forty-two to fifty-five pounds were taken in northern Germany, supposed to be only fifteen years old; we have another record of a carp taken on Ascension day, 1520, weighing seventy-eight pounds, another taken in the present century, in Switzerland, which weighed ninety pounds. These giant fish were

taken in a colder climate than ours, and in some instances where it had to spend nearly seven months of the year in its winter sleep.

Are not the waters of America better than all the rivers of Europe?

It is to be considered that the waters of the milder climate of this country possess the advantage of greater abundance of food. Scarcely to be judged or estimated as to its proper value as yet, the carp may be able to take food, three-fourths or nine month of year, and even in the south perhaps the whole year, and omit its lethargic winter sleep, conditioned by the cold winter. There is scarcely a comparison to be made, so far as the carp is concerned, between the rivers of this country, so richly supplied with food, where it will not be compelled to seek for food under constant strife for existence, and those much poorer waters of the Rhine, Elbe, etc. If in the ponds of Perry county, the carp has attained to the enormous weight of five and one-half pounds at the age of two years, and without artificial feeding, what may be expected from the warmer sections of our country, and why should we not make an effort to secure the benefits of so valuable a fish?

Fourth. Construction of ponds.

Ponds should not be too deep, as the water will be colder, and will harbor fewer insects, larvæ and worms, which form part of the carp's food; besides this fish does not grow fast in cold water; a depth of say three feet in the center is sufficient; towards the outlet sluice it may be from six to eight feet deep. The outer part of the pond should not be deeper than one foot, so that the water there may be warmed by the sun more thoroughly. The inflow of water into the pond should never be direct, as, for instance, a brook falling into it. The water should be conducted into the pond sideways from the stream. The ponds should be constructed so that they can be entirely drained or drawn off, in order that the fish may more readily be taken.

MANURES AND FERTILIZERS.

By D. B. McWILLIAMS, *Walnut, Juniata county, Pa.*

(Read at Juniata County Institute.)

By the term "manures", I wish to be understood to refer to stable or barn-yard manures and I will treat first on their composition; second, their value; third, their application, to obtain the best results and remunerative returns.

Stable manures are composed of litter and vegetable matter, grain excrement and uric acid. These are the component parts of good stable manure; although there is much termed manure which is void of at least two of these elements. The uric acid being the most important factor in composting or preparing the manure heap, it is necessary that the straw produced on the farm should pass through the stables in order that it may absorb and become saturated with it, and become submissive to the chemical action, which naturally and necessarily must take place. It is still more important that the three component parts be combined in the stable before it is added to the

manure heap or hauled directly to the field. The amount of manure produced on a farm may be calculated approximately from the amount of grain, fodder and litter used. But in some instances it may vary, for the fact that through carelessness and slovenliness, feed and litter is scattered around profusely and promiscuously, the manure heap covering perhaps one quarter of an acre of ground. I am, however, glad to say that my observations have revealed the fact that such instances are seldom met with. But there is a difference in farmers on this point; some farmers will accumulate a larger amount of manure from the same amount of raw material than others. "Direct experiments have shown that, of one hundred pounds of dry matter of the fodder, the following amounts pass into the excrements (solid and liquid together): Horse, fifty-three pounds; milch cow, forty-four pounds; ox, fifty-two; sheep, forty-eight pounds. We may say then that on the average about one-half of the dry matter of the fodder passes into the manure. The fresh manure contains only one-fourth its weight of dry matter, the rest being water. We assume that all liquid excrements are saved and go into the manure, being largely taken up and absorbed by the litter. When they are allowed to flow off along the drains into the public highways, or soak into the ground, a very considerable loss of the most valuable portion of the manure will take place. This loss is the more serious, since the solid and liquid excrements of farm animals mutually supplant each other. But it has been asserted that the dark waters which flow from the stable yards are not always the leeching from the manure, but may in some instances, only be water colored by the carbon. But I do not offer this to you to soothe your conscience aroused by your neglect or oversight, but to show you that colored water is not always manure. But in no sense should you allow any of it to go away except upon your fields on the farm.

The elements of plant food which are found to exist in rich stable manure are tabulated as follows:

The solid excrements contain most of the organic matter and almost all of the phosphoric acid and lime, while the urine contains by far the larger portion of the nitrogen and nearly all the potash. Either one alone would be termed a one-sided manure as it requires the two together to furnish all the elements of plant-food necessary for plant growth. Having considered the component parts or composition, we are now brought to consider its value.

Our stable manure, or its value, is based on the value of the materials which enter into its composition. Its value is increased or diminished in accordance with the amount of grain or its equivalent in mill feed or meal fed to the animals, and the animals it is fed to. The products from the stable where but little grain is fed, or where it does not enter into the rations at all, will not be of as much value as where it is made an important part of the food. The elements of plant-food will be found to exist in the manure just in proportion to the richness of the food.

The estimated value of a load of manure is from two dollars to two dollars and a-half per ton; but I believe its cost will exceed these figures at least one-half and it may double them. It cost you just the amount of hay, fodder, straw, corn, oats, and other feeds which may enter into its composition. If a farmer feeds forty tons of hay, twenty tons of corn fodder, fifteen tons of straw, one thousand bushels of corn, five hundred bushels of oats, and perhaps two or three tons of bran, it costs him the aggregate of the value of each article, together

with his labor. Some men hold the idea that the time spent or labor performed in preparing the manure on the farm, should not be counted, as it is done at a season of the year when he could not do much else on the farm; but I hold a different view. A farmer's labor should be worth just as much at this work as when he is sowing the seed. From the value of the material and labor deduct, the increase of growth and improvement in the value of your stock, the product of your cows, it from the cost, and you will very closely approximate the value of your manure. The remainder divided by the number of tons would show you its value in dollars and cents.

Its agricultural value will depend upon the percentage of plant-food it contains. This is also an important factor in determining its commercial value. You cannot tell nor determine whether the elements of plant-food are in an available form or not. You must "hope and wait." Its value will also be increased or diminished in accordance as to whether it has been kept under cover or not. Also the location of the yard; whether the liquids are held or allowed to waste. Its value, I think, can be increased by the use of gypsum or land plaster in the stables and on the heap. And in this connection its offices are two-fold: retaining the ammonia and hastening the decomposition of the vegetable matter and converting it more speedily into plant-food. Now, if seventy-five per cent. of the fresh manure is water, what percentage of water will it contain when it lies eight months out of the year therein, and especially in a wet season like that of 1889?

I would recommend hauling direct from the stables to the field and spread either off or after the wagon. By doing this there is no waste, as the leeching would otherwise run away or soak down into the soil in the barn-yard where it yields no return. If the manure is not hauled from the stable to the field, but deposited and remains in the yard until fall seeding, it should be hauled out and spread two weeks or more before you wish to begin to plow in order that it may leech out and the liquid be taken up by the soil. It is a wrong practice to haul manure and leave it in piles for from three to five weeks, as I have sometimes seen the leechings or liquids being absorbed by the surface covered by the heap or pile. If manure is plowed under it should not be plowed too deep. If too deep you get the plant food too far away from the young plant. Some argue the roots will find it. So they will, or may; but the time the plant needs the best nourishment is at the start. My objections to plowing down manure just after it is spread is the fact that the liquids are taken up by the subsoils and are liable, or at least part, to get beyond the roots. If manures are applied after plowing it should be also spread immediately and worked or thoroughly mixed with the surface soil. It is very important that the farmer should have some idea of the value of his manure, and also of the elements of plant-food it contains; this he should study and learn so as to produce a good quantity and quality.

By the term "fertilizers" I am to be understood to treat the subject of commercial fertilizers. I shall use two terms here, that of a fertilizer and a complete manure. By a complete manure I refer to a brand of goods which contain all the elements of plant-food, as they are found to exist in the cereals, namely: phosphoric acid, ammonia and potash. A brand which contains only one or two of these elements of plant-food is not a complete manure, nor is it a complete fertilizer. Phosphorus is found in animal bone, fish, phosphatic guanos and mineral phosphates. When treated with vitriol the lime has a greater

affinity for the acid or vitriol than it has for the phosphoric acid (another element found to exist in these materials) hence they are separated and the phosphoric acid, which was insoluble has been changed and a large percentage has been made soluble. The degree of solubility will depend somewhat upon the substance, the degree of fineness it is ground and the amount of acid used. What is meant by the term soluble is that it will dissolve in water.

Nitrogen is commercially the most costly fertilizing element, yet its office seems to be that of a stimulant and to force rapid growth. It exists in some forms of a volatile substance, whilst in other forms it is not so. Organic nitrogen is the nitrogen of animal and vegetable matters generally existing in the albumen and fibrin of meat and blood, in the uric acid of bird manure and hippuric acid of urine. Ammonia and nitric acid are results of the decay of organic nitrogen in the soil and manure heap and are the most active forms of nitrogen. In commerce the former in sulphate of ammonia, the latter in nitrate of soda: their ratio being seventeen parts of ammonia to fourteen parts of nitrogen.

Reverted phosphoric means phosphoric acid which was once freely soluble in water, but from chemical change has become insoluble in that liquid, although they are readily assimilated by crops but do not distribute freely by rain. Insoluble phosphoric acid is beneficial to future crops when obtained from some material.

Potash is the substance known in chemistry as potassium oxide, which is the valuable fertilizing ingredient of potash-salts. It is most costly in the form of high grade sulphate and less so in the form of muriate or chloride. These three elements of plant-food are what is found in a complete fertilizer, and a fertilizer without these is not complete.

Their value. A fertilizer has two values, commercial and agricultural. The former is the result of a chemical process, the latter is shown by the results on the crops. Both these values can best be estimated or will depend upon the materials from which they are made and the manner of manufacture.

A high percentage of ammonia will increase the commercial value, but may not be of a corresponding value to the user, except it be for vegetables. Where stable manure has been applied liberally and other vegetable matter turned under or incorporated with the soil the farmer has an almost sufficient supply of it. But some should be used to start the plant, for we cannot tell whether the ammonia already in the soil is in an available form or not. So then the real value of a fertilizer can only be fixed in accordance to the return in crops and adaptation to soils. But my experience has proved that their agricultural value is increased by a liberal supply of potash. Bone phosphates are to be preferred at all times to mineral phosphates, or guanos. Farmers and users of fertilizers, when phosphoric acid only is needed generally supply it by the use of mineral or acid phosphate. It has always been a doubt in my mind whether this was good economy, owing to the fact that we get it at an expense of a large per cent. of sulphuric acid, and the large percentage of insoluble matter they contain, which in my judgment never gives any return.

How to apply them. I would recommend their use or application in connection with stable manure, for two reasons: First, we supply all the elements of plant-food. Second, their chemical and mechanical action on the vegetable and undecayed material in the manure will

hasten the decomposition and solubility. For this I would recommend goods with a low per cent. of ammonia, about eight to ten per cent. of phosphoric acid and four to six per cent. potash, although more would be better. The manner of applying should be with a fertilizer drill, as it is more convenient and distributes more evenly.

They should be sown when the soil is damp; if possible, after a rain, when the soil will close in the drill holes sufficient to cover the seed. The thorough preparation of the soil has a very great part in the results of fertilizers on a crop. A well pulverized seed bed and sowing shallow by all means, for wheat and oats; for corn and root crops it should be sowed deeper. As to best mode of applying the two latter, men differ and generally use their own method. In applying fertilizers the farmer should form some idea of what he needs. If he has nitrogen already in the soil from manure or some other source of vegetable matter he does not need much ammonia in his fertilizer. If his land has been recently limed he will not need as much potash. If his soil is worn out and void of nitrogenous matter he then needs the three principal elements, and especially a good percentage of ammonia. The kind of crop he wishes to grow has something to do with it also. If potatoes, corn, and root crops, he wants a liberal supply of potash; and he should apply it liberally. It is said, "the liberal soul is made fat." You can make your land fat if you are liberal in supplying plant-food. It will pay you better to use it liberally than sparingly. It will cost you more money at the time, but you will find the "promised land" is only in the near future; indeed it is the sure road to the fulfillment of your hopes and expectations.

In regard to lime. Scientific men generally hold the idea that lime is not a fertilizer in the strict sense of the term, and that our crops do not require as much lime as farmers generally suppose. It supplies potash and the alkalies, hastens the decomposition and solubility of the vegetable and other inert matter, and converts it into plant-food. In a discussion on this subject at a former meeting of our State Board of Agriculture, our honored secretary of agriculture advanced the theory "that quick lime, when placed in the soil, absorbs carbonic acid and goes back to its original state of carbonate of lime, or the original state of limestone. Mr. Edge also says that from nine to fifteen pounds of lime is all that any crop will take out per acre. Now if these two theories be true (and it emanates from good authority) the putting on of one hundred to two hundred bushels of lime per acre, is the proper thing to do. If lime reverts or goes back to the original state, how much benefit do you derive from it, or, in other words, does it pay? This should be the standpoint from which it ought to be viewed. I believe many agriculturists are of opinion that lime and manure, also lime and fertilizers, should not be used together. But my experience has proved to me that this theory will not hold good. Lime must have some vegetable matter to work on. If it does not, its action will be very slow. Now, fellow farmers, what you want to do is to experiment for yourselves, and if possible ascertain what your soils need, and the best manner of applying them; stop the leaks of the manure bank, which is the farmer's bank, and be careful where the surplus goes,—not along the roadside but on the field.

BEAUTIFYING HOME LIFE ON THE FARM.

By MRS. MINERVA GARRESTON, *Ardentville, Pa.*

(Read at Millville Institute.)

There is a garden in her grace,
Where roses and where lilies grow,
A heavenly paradise is that place
Wherein all pleasant fruits do grow.

Since the days in the long ago, when Adam and Eve dwelt in the Garden of Eden, and the beauties of that paradise was theirs, to enjoy, the chief pursuit of man has been to search out happiness.

The ideal of that happiness is to gain for himself an abode like unto that of our first parents, and call it his own.

Each of us can make for ourselves a home, adorn it with beautiful things nature has so lavishly given, if we so desire, and all she asks in return is the care and labor bestowed on her treasures.

Those whose heart's desire is to have for themselves this ideal of a home—this little Eden all their own—have only to bring to their aid the beautiful things nature has provided, and with willing hearts and ready hands rear for themselves an abode of peace and plenty.

It is not wealth that gives to some homes that air of attractiveness so inviting. It is the individuality of the inmates that is impressed upon their surroundings and gives character to all about them.

There is no surer exponent of the refinements and high moral culture of a neighborhood than the appearance of the homes and their surroundings.

The humblest cottage, about whose doorway are climbing vines and whose windows are draped with their clinging tendrils, presents to us a much more inviting picture of happiness and homely pleasure than its more pretentious neighbor of stone, with its barrenness of grandeur.

The inspired writers sang of the loveliness of nature, and the grandest inspirations and illustrations were drawn from the same inexhaustible source.

The bard of all ages have taken up the refrain, and it shall continue to echo down the halls of time till time shall be no more.

It is our privilege and our duty to gather about us all that will help to make us better and to make for ourselves such a home as will influence our character for good, and develop in us higher ideas of living than that of a mere animal existence.

Let us surround ourselves with the luxuriance and beauty of nature, become familiar with her charms and graces, and bring of her stores to decorate our homes.

There is an influence emanating from an intimate association with nature that is ennobling in its tendency, and which will lift our thoughts above the grosser things which are physical to things intellectual and spiritual.

In this intercourse with nature we are developing a love for the truly good and beautiful, and receiving a refining influence that cannot fail in having its effect on our lives.

We look through nature up to Nature's God.

When its riches are brought into the homes of the poor even the

squalor of poverty disappears and a ray of the brighter light from above takes its place.

What endearing recollections gather around the scenes of early days! "The orchard, the meadow, the deep tangled wildwood" were free and unfettered as the mountain air we breathed.

How plainly we can see the rustic church to which we were led by the hand of paternal affection on each returning day of peaceful, holy rest; but prominent in the foreground of this picture stands the home of our domestic enjoyment, the sanctuary of the family circle, where, under the guidance of a father's counsel and a mother's love we passed the sunny hours of life's sweet spring-time, full of the purest delights and tenderest associations.

Sad, indeed, it is that there are hundreds in the multitude who inhabit this beautiful world of ours who do not know the true meaning of the words "home" and "mother;" others who physically have been well cared for, but whose mental training has been so wholly neglected that they have been robbed of an education, which is the richest inheritance that God has given parents to bestow upon their offspring.

"Habits formed in youth go with us through life."

How necessary then that the parents should exert a good influence over the children—train them while young and under their immediate care—so that when the time comes for them to enter upon the various duties of life and they find that the career of man is beset with trials, disappointments and temptations, they can look back to their early days and lean upon that strong staff, home influence, which has saved many a man from ruin and many a woman from everlasting disgrace.

The place called home should be adorned and attractive in all its surroundings for he only who has a home to love and a home to defend can best do his duty to himself, his family and his country.

Magnify as you please the laws and the constitution, it is the strong home feeling that gives the potent influence.

The man who has a spot on earth where he planted a tree, or his wife has nursed a flower, will, in the hour of trial, evince a heroism that will put to shame the hollow pretensions of all the blatant politicians in the land.

Added to this is the happiness and independence enjoyed in the possession of a home that you can call your own.

When beholding the beauties of nature, the everlasting hills and lovely valleys, carpeted with living green, the whole richly colored with the full blooming fruit trees, or their bending boughs loaded with growing, ripening fruits, to which the lofty oak, spreading chestnut, the pines and the cedars lend a pleasing shading, or of fields covered with growing and maturing crops of waving grain or corn, while in other fields are noticed herds of lowing, patient cattle, neighing horses and gambling sheep.

How one loves to revel in the memories of by-gone days!

Associations come drifting down the years in romantic and picturesque beauty.

We ask will such ages come again?

The present is too real to be romantic, too practical to be poetic.

In this age of unrest and excitement more than ever do men look back in vain.

The eras that have gone have gone forever.

Life is a stream ever flowing onward.

The river broadens, deepens and changes as do the ways of the ever busy world.

Give your sons and daughters the best education your means can command. They will find that agricultural pursuits, to be successfully conducted, will fully employ the highest talents and the largest mental gifts.

Farmers have on their table agricultural newspapers and magazines in which they glean how best to raise cattle. And are their children not as necessary to have educational journals also on their tables, and therein study well how to rear their sons and daughters? Let us glance at a few definitions of education.

We find the ideal of the founders of the Prussian national system is given shortly as "the harmonious and equable evolution of the human power." James Mills says, "The end of education is to render the individual as much as possible an instrument of happiness first to himself, and next to other beings."

But happiness is not the end of life—character is. Hence, there should be symmetrical development. The improvement of the spiritual, mental, social and physical condition of the sons and daughters of farmers entitles them to the respect, confidence and closer sympathy of the community and public.

Look how the plant develops. It first breaks through the crust of the earth, it keeps growing, and presently a leaf pushes forth toward the rising sun, then another toward the sinking sun, expanding, assuming beautiful shapes, webbed and veined with delicate arteries; other leaves follow, one above another, until it becomes a beautiful plant and we see waving and nodding upon its crest a full blown rose of color, dyed in the sun, fragrant with the breath of perfume.

But there is the peculiar isolation of farmers' families; their sons and daughters are withdrawn into a world of their own.

They feel out of practical relation to the community, its affairs and enterprises of the surrounding country and adjoining towns; hence arises selfishness and also the prevalence of that pernicious idea that no direct and efficient service to public affairs, no immediate or future eminent usefulness to others is, or will be, expected of them.

Educate your children with practical truths evolved from your own experience.

Let them learn to use, not the willowy reed of self-importance, but the stout hickory of self-dependence.

Do not make of your homes mere workshops. Let them be restful places, havens where they are safe from the deceit and malice of the world; from the threshold shall cross pure, healthy, God-fearing men and women, bearing with them bright pictures painted by the brush of memory, for these will feel through the ever-widening circle of their lives those waves of influence which began with their birth and shall follow them until both are lost on the farthest shores of time. It never seemed to me that there was as much of real joy and comfort shown by families who only had the money-making motto before them as there was by those who used it with moderation and intelligence as they went along.

I have been puzzled some times to know where the brute quit and man began, for, like beasts of burden, they arise in the early hours of morn, toil till late at night, then lie down and are soon oblivious to all surroundings. The next day is a repetition of the last, thus year in and year out they wear their lives away.

They die, and the only true eulogy that is pronounced over them is: "He was a hard-working, industrious man." "She was a hard-working, industrious woman."

They who work in this great laboratory of nature are furnished with elements of natural history on every side and abundant material for experiment and profound thought.

So when the joyous spring-time comes again, let us with glad hearts place the seed in the ground, then with patience and confidence await the germination and the fruition that shall crown our labors with success, rejoicing that we are counted among the favored ones, who, while pursuing their vocations, may reverently worship in

That grand cathedral boundless as our wonder,
Whose quenchless lamps the sun and moon supply,
Whose choir the winds, whose organ thunder,
Whose dome, the sky.

HOW DO WE WANT OUR CHILDREN EDUCATED?

By JOHN R. ROBINSON, *Plumer, Pa.*

(Read at Franklin Institute.)

The subject is an appropriate one for two reasons:

1. Changes in our schools, as agitated of late, concern our cities only; the plan being to erect central industrial schools in large cities which would be of little or no benefit to our country schools.

2. Legislation is proposed this session of the general assembly to enable the state to publish and furnish, free or at cost, the books necessary for use in our public schools; and here is an opportunity for the members of this convention to express themselves positively as to what they desire their children to be taught, and how.

Much of school study is stoutly defended on the ground of its being disciplinary. The argument is valid as far as it goes. Muscle may be developed by lusty use of a dull ax: the duller it is the greater the exertion required to do the same work. Effort, however, should be put forth with a more laudable motive than one purely subjective. It is well to wish to be strong and to exercise to be so; but when possible the subjective should be followed by the objective results in the shape of work done. Do something and the worker will be benefited. If he wants muscle, use a sharp edge and see how big pile will grow under his strokes; then is there zest given to the effort made. Our educational system is an adroitly concocted affair calculated to give the victim a considerable amount of discipline with little else to show as the result of years of study in the matter of work done. Our schools have been principally regulated by theorists and book publishers. The theorist would impart information and opinions that are of service to the man of means and leisure, but for the poor boy, it not only does not teach him how to make or use money, but often makes him terribly discontented with his lot. His mind is trained for future or scientific research but his hand and common sense are not trained to win what he wants. Result—blank failure; the history of thousands of our school men.

In this competitive era the first thing to do is to teach our children how to win bread and butter, and, second, train the mind to appreciate the æsthetic in life. Our school system tends to reverse the order and the reflective student is liable to become a dreamer, while the stolid boy on whom books make less impression is better able to settle down to the practicality of financial accumulation. The boy whose mind is engrossed in literary and scientific studies can concentrate his mind less forcibly on his every-day work. Some one suggests that if he has made a specialty of that kind of study let him follow a calling that will most fully utilize his knowledge of it; but does not that proposition strike you as something ludicrous? It surely is in strict conformity with the theory of the visionary—adapt the calling to the study; adapt the boy to the books. Even then much of this stuffing cannot be applied. Years are spent learning the locality of the Purus, Caral Sea, Colombo, *ad nauseum*, also learning to conjugate and dispose of fine grammatical construction; do we not admire the person whose knowledge extends to so many points of which we are densely ignorant? No; there is no reason why we should, for such acquisition is pedantry. It is alike useless to the professions and trades. It may afford some discipline to the mind but life is too precious; we must make effort result in objective work done as well as mental training acquired.

How do we want our children educated? By developing all that is manly or womanly in them; by impressing upon them that life is made up of a series of efforts backed by indomitable determination to accomplish something. The lesson to learn is how to earn and spend the dollar. In school studies are reduced to a mechanical sameness so that desire to study for its own sake is often effectually stultified, and when released from school the studies are abruptly dropped. Special aptitudes of pupils are repressed.

All are drawn to a common plane of mediocrity with possible talent unrecognized, and those who go higher must needs do so in spite of their conditions. Our school studies are not such as call into action the latent germs of inventive genius, of oratory, that prepare the merchant or farmer for their vocations either in thought or practical training.

We want the eye and hand trained; the faculties for measuring and calculating; to learn how to get good value for money or effort expended. Our boys and girls should be familiarized with past and present events of state and with the possibilities of the future. We want every boy to realize that they will one day be factors in politics, and to grow up ready to clinch with the questions of taxation, coinage, the relation of capital to labor, the adaptation of farming methods to changed conditions resulting from settlement of the west and improved machinery; to stand side by side with persons of any condition and hold their own intellectually, as men, and why not financially?

The most impressive school to the child is the home and fireside; and after all our greatest attention to educational matters must be directed there. Listening to or conversing with his father, watching and imitating his example, exerts the strongest influence over a boy. Some men make companions of their boys and converse with them seriously as with equals: talk with them about affairs, give them opportunities to display their ability in transacting simple forms of business; draw out and thus develop within them positive opinions in matters of politics and work.

Give the boy a defined interest in what he works with, compensate

him fairly for his efforts or rather for work performed, and you will be almost certain to make of him a bright, thoughtful, far-seeing business man, even though he has seen but little of a school interior. Old-fashioned horse-sense will go further than schooling any day though a combination of them is still more desirable. The ancient Spartans set a notable example in training their boys by encouraging them to linger in the presence of the wise men and hear the weighty words which dropped from their lips.

Our boys and girls are confined to the stupid grammar while the fascinating study of natural science is allowed to go by default; and yet the latter will develop the faculties of perception, reflection and comparison more fully than will grammar. Take the child six, seven, eight years old or younger, it drives it into wild ecstasy to get hold of and examine some animate thing. The very baby is intensely interested in observing the movements of a fly and desires to handle it. The principles of natural philosophy and rudimental mechanics are more readily learned than the locality of place, only to be forgotten on deserting the school room; neither will a knowledge of natural science become a dead letter in after life. The introduction of natural science into the school room would not necessarily mean hideous technical and formal study of entymology, etc., but, divested of the phrase of dead language, the child would be brought into intelligent contact with things, and knowledge would find easy vent in action, and we would then have reached what educators now seek, a natural and immediate connection between *learning* and *doing*. It means the study of things and working with them. Is not the proper test of what constitutes a profitable study whether it be utilized in after life? There is but one way to make our schools successful, and that is to combine theory of the school room with the practice obtainable outside, teachers exercising a general supervision over both with the assistance of parents. This method can be easily adopted without much expenditure and would be fascinating and profitable to parents, teachers and especially pupils, and is particularly applicable to country schools. Introduction of industrial training schools into our cities means enormous financial outlay; the adoption of it in our country schools by combination of school and home work is more feasible and has economy to recommend it, for it requires simply a change of plan, not great outlay of money.

School study is mainly a receptive matter to the pupil, and to enable him to benefit fully by the in-pouring process, it must be accompanied by a hearty exercise of the executive faculties, a vigorous application of what he has learned to something he wants to accomplish. How, now, is he going to use his profound knowledge of Patagonia or display his skill in the analysis of relative pronouns?

The child more than the adult should learn a thing and then do something with that acquired knowledge. The right test of what constitutes a proper study is whether it be utilized after leaving the school room.

This world is becoming terribly wide awake and anything our children are taught must be to the point and of use to them in fighting their way.

The people of this country have momentous issues on hand that cannot be met by indifference or passive thought. The brains of the Americans are going to be racked in the effort to solve knotty political problems. Feeding the minds of the children with food for which

they have no natural taste must give way to supplying them with solid nutriment in the shape of impending questions of social government. We want our children to be positive, aggressive and comprehensive thinkers and workers.

It is somehow a misfortune of the teaching profession to have it constantly filling up with raw recruits in the persons of teachers who are unable to keenly discern the wants of pupils with the deplorable result that pupils have to be adapted to books. It takes a person of wide experience to be an efficient teacher; he must be able to reach away ahead, to deep, important things, and reach down and show the child mind how it may ultimately reach them, and properly encourage it to do it. The natural teacher is the old man or woman with story telling propensity, and nature's pupil the child with an insatiable appetite for stories—to be told something so it can learn.

The best teacher is the reflective man or woman of maturity whose faculties are still active or growing; but, alas! for the pupil who sits under the authority of a fossil! The most of our best teachers are not to be found in the school room; they are farmers, merchants and manufacturers; their pupils are their children.

We must look largely to our agricultural colleges to devise and perfect methods of teaching our children what they should be taught, and the test of the practicability of these methods should be whether they can be adopted in our every-day country schools; for otherwise it is a perversion of the idea of popular education.

CATTLE FEEDING.

By R. S. BREAM, *Gettysburg, Pa.*

(Read at Adams County Institute.)

Several years ago, while listening to a conversation between three or four of the most intelligent gentlemen of our county, I heard one (a physician by the way) make the following remark:

"While driving through the country, without making any inquiry, I can point out the farms on which the owners have made cattle feeding a business." Thinking the assertion a rather strong one, I at once began to make a mental survey of our own immediate neighborhood, and after a few moments' thought came to the conclusion that the gentleman knew exactly what he was talking about.

While all farms are not poor where cattle feeding has not been made a business, I know of none that really are poor where it has.

With cattle feeding, like every other undertaking, there is a business side, and whether a man is successful or not depends very largely upon how the business is conducted. In the first place, it is necessary to know what kind of cattle, in what kind of condition and when to buy; second, how and what to feed in order to get the best results, and, last, but not least, how to sell. I venture to say that if any intelligent farmer who has made cattle feeding a business, say for ten years, were asked the question, "Has the business been profitable?" he will answer yes. Of course the profits are usually not very large, neither

are they very large in any other of the branches of our business. For example, we will say a man buys ten head of young steers, average weight nine hundred pounds. He pays three dollars and twenty-five cents per hundred for them; whole lot cost him two hundred and ninety-two dollars and fifty cents; say he feeds them forty-five bushels of corn, ears, apiece, or four hundred and fifty bushels to the lot, one and one-half tons of wheat bran, making fifteen bushels to the head, in all about sixty bushels of grain to each steer. Counting the corn worth fifty cents a bushel and the bran twenty dollars per ton, the cost of feed amounts to one hundred and forty-two dollars and fifty cents. This amount of grain fed in five or six months, should produce a gain of three hundred pounds to each steer. The lot then average one thousand two hundred pounds apiece; selling them at one dollar a hundred more than cost they come to five hundred and ten dollars.

This stable of cattle cost	\$292 50
Value of grain fed	142 50
Interest on money invested six months ...	8 76
Total	<u>\$443 76</u>

Deducting this from what the cattle sell for, we have sixty-six and twenty-four hundredths left, or about sixty-five cents a bushel for our corn, allowing the hay to go toward what the manure is worth, as we claim it is worth much more fed on the farm than it is to sell. The above calculation I only give as an illustration. Some feeders prefer feeding a certain quantity of oats, others rye, and so on. A man should feed whatever he thinks produces the largest gain at the least expense. There are also many farmers who claim to put on a much larger gain than I have given in my calculation with less feed. This, of course, makes larger profits. Then again, we sometime sell for more than one dollar advance on first cost. True sometimes for less, my experience has been oftener for more than for less. We admit that the profit is very small, counting market price for grain fed, but it is for the purpose of converting the grain and hay into manure and by this process returning it to the soil, where it should remain, instead of hauling it away to market. For this reason cattle feeding should be encouraged. Of course, it is not necessary for every farmer to feed cattle in order to convert his hay and straw into manure; if there are a large number of cows kept for dairy purposes, or stock raising is made a business, either will answer the purpose very well, and probably more money will be made than by fattening cattle for market. One of the reasons why many farmers prefer fattening cattle for market to stock raising or dairying, is they do not have them on their fields during the summer months, when, as is very often the case, the land is either too wet or too dry, and consequently a great amount of injury is done.

I venture the assertion (and I believe that almost every man who gives any attention to agriculture will agree with me), that if a farmer were to buy one of the best farms in Adams county and then make it a rule to sell all the grain, hay and straw, keeping only enough to feed the number of cows usually kept on a farm and the horses used in cultivating it, in ten years' time he would own one of the poorest, even if he did buy a few tons of commercial fertilizers. Another very important matter that can be traced directly to cattle feeding that must

not be overlooked is this: Any one who has given any attention to the markets is aware of the fact that corn in southern Pennsylvania usually brings as high a price at our cribs as it does at the city markets it is also the case with oats and rye. The reason of this is home consumption.

It is estimated that there are about three thousand head of cattle fed in Adams county alone, annually. Allowing only fifty bushels of corn in the year to each steer, the amount required to feed this number of cattle would be just one hundred and fifty thousand bushels. Now suppose we would quit the business, say for just two years, what would our grain be worth? I am sure the price would not justify our raising it at all.

In conclusion, I will only add that to maintain and advance the fertility of our soils under cultivation is a question that should demand the most serious consideration of every progressive farmer.

A DIVERSITY OF INTERESTS THE NEED OF THE FARMER.

By THOMAS BAKER, Octoraro, Pa.

(Read at the Atglen Institute.)

It has long been a maxim in agriculture, that several kinds of crops are safer to depend on than to expect profit from some one or more leading staples, so that if from any cause, one and that perhaps the main one, should fail, the remaining crops would be left to recompense the cost of production and something more.

Recurring to examples to illustrate this, I beg leave to refer to the Irish tenant farmer, whose main dependence is, for the subsistence of his family, the potato and oat crop, for, though wheat and rye generally do well in his land, yet potatoes furnish a cheaper and perhaps I might say a better diet, for its people.

The stalwart limbs, the brawny muscles and the enviable constitutions of the Irish race, attest the suitable food that induces these invaluable qualities, that go to make the robust frame that these people undoubtedly possess.

Therefore when the potato crop fails, either from rot, or any other cause, the poor Irish have but little else on which to subsist, so that a more varied agriculture would not only conduce to his independence and comfort but to his purse as well. The climate will not mature Indian corn, but it seems to me there are many vegetables that might be cultivated there that have not yet been introduced. The Dutch farmer, in about the same latitude has a much more varied agriculture; he has all the crops his Irish neighbor cultivates, and some more; quite a considerable part of his living is derived from the produce of his incomparable dairy; beef, butter, milk, cheese, whey and I hardly know what else, all of which largely contribute to the sustenance of the hardy, healthy race that rejoices in the plenty that prevails from year to year in the lowlands of Holland; he hardly fears a dearth of food; if the potatoes fails, he has other kinds of food under cultivation, that shut out all fears of starvation, and he seldom needs the aid of charity.

His industry, his perseverance has almost created the country in which he resides: where once, rolled centuries ago, the sluggish waves of the North Sea, over shifting sand banks, there now dwells and inhabits the most densely population of any land upon the globe, China only excepted.

The climate of the middle states of this Union is, upon the whole, an admirable and a safe one for the careful farmer. All crops may not be large the same season, neither have all failed to remunerate the cultivation, some are fairly good and none rarely fail altogether, so that there is a fair average, taken from year to year. If dry weather prevail in the spring months, plenty of rain falls in the after part of the season, for the average yearly rainfall of from thirty-six to forty inches seems as yet invariable and absolutely certain, if we do not get it in the early part of the season it will come afterward, and a large after harvest crop is sure to succeed a scanty crop before midsummer. We are equally exempt from the terrific rains that often flood out our western neighboring states, and equally secure from the extreme drouth, that, lasting for months, starves out vegetation and leaves to the cereals, little or nothing. As farmers we have had, as yet, no such experiences. It is not beyond the power of eastern farmers to raise average good crops. What more should we desire, only to know what to cultivate, and how to do it; that is the whole secret. Our situation in respect to markets, is perhaps enviable, and will not lessen as time progresses for the cry of many now is that city populations are increasing faster than the population of the rural districts; and if that be the case, better markets must follow in the future than have prevailed in the past.

So now in this beautiful rural district possessing so many advantages of the soil, of climate, and of regular seasons, let us display our wisdom by striving to introduce an agriculture more varied. Let us inquire in what undiscovered field we may find, something hitherto untried, that will furnish labor to the workingman, and remunerating profit to the landowner.

In the days of Napoleon, that man of destiny, that burst like a thunderbolt upon the destinies and effete dynasties of Europe, his ever watchful eye, keen to overcome a rival, not only on the battle field but upon any other, introduced and established the sugar beet root culture in middle Europe, and thus rendered not only his beloved France, but many other neighboring powers independent of English ships and English colonies for their supply of sugar.

He thus not only inflicted a peaceful and innocent blow upon his greatest enemy which was England, but he established and fostered an industry that yet exists there. It has not been supplanted by the sugar cane products, increased as they have been in both hemispheres, and the best sugar is a common article of commerce in the great markets of Europe to this time, and so far as human wisdom can see, is now firmly established.

Moreover the beet is extensively cultivated in Europe for feeding cattle, its leaves affording a very nutritious food for all kinds of live stock, its roots, from their exceeding sweetness, being considered one of the most valuable plants on which cattle can be fed in winter. There are few crops so valuable for this purpose. Swedish turnips or ruta бага exceed them in the quantity of nourishment, weight for weight, but on good light soils the produce of the best, per acre is much greater. The proportional value of hay, potatoes, Swedish tur-

nips and beets, in feeding cattle is stated by good authority to be as follows: eighteen tons of mangel wurzel are equal to fifteen tons of Swedish turnips or seven and one-half tons of potatoes, or three and one-fourths tons of good English hay, each quantity containing the same amount of nourishment; but the roots may be grown upon less than an acre of ground, while two or three acres of good grass land are required to produce the equivalent amount of hay. The beet root is also deemed the least exhausting to the land. The white beet has been chiefly cultivated for the purpose of extracting sugar from its juice. The manufacture of sugar from beet roots was first commenced in France in consequence of the Emperor Napoleon's scheme for excluding British colonial produce. It was known that a crystallizable sugar could be obtained from the juice of the beet root, and he encouraged the establishment of beet root sugar manufacture on a large scale, by every advantage which monopoly and premiums could give it. Colonial sugar was sold as high as a dollar a pound; and as sugar had become an indispensable luxury in France, the manufacture had every chance of rapid and complete success, although the process was expensive. It has since been much improved, and beet sugar now competes on nearly equal terms with colonial or cane sugar in the markets of the world. Most of the operations in manufacturing beet sugar are nearly the same as those by which the juice of the cane is prepared for use, but much greater skill and nicety are required in rendering the juice of the beet root crystallizable owing to its greater rawness, and when beet sugar is refined it is said to be impossible for the most experienced judge to distinguish it from the other, either by taste or appearance. Five tons of clean roots produce about four and one-half hundred weight of coarse sugar, about half of this amount of the refined article, the remainder being made into molasses as in the case of the cane.

As a further illustration of the benefits to be derived from a greater diversity of agricultural products, I would refer to the southern states of this Union at and before the inauguration of the late civil war. Possessing as they do, an eminent domain of as fine agricultural land as can scarcely be found elsewhere, a genial climate, their rich mines of the useful minerals, their abundant water power, all tend to make them, it would seem, the richest of agricultural people. Cotton however had the supremacy, it had even the name of king, and the cultivation of it so largely, to the exclusion of other crops, made them dependent upon the neighboring states for their supply of food products. They did not raise the corn, the hay nor the flour needed for domestic consumption; this was produced elsewhere. The result could easily have been foreseen; they were not a prosperous people because they were not independent of their neighbors. They declared war against their sister states, their ports were blockaded, and they were compelled to try to live without intercourse with the rest of the world, and the history of the four years of war that followed revealed their extreme weakness. I will weary this audience with but one more instance to illustrate my subject. Adam Smith, in his *Wealth of Nations* says, the prosperity of people and communities depend upon the diversification of their industries as well as upon the righteous, administration of good laws over an educated people.

WHAT I KNOW ABOUT FARMING.

By JAMES L. BRANSON, *Langhorne, Pa.*

(Read at Atglen Institute.)

What I know about farming may be very little, and it is not because I think I know so much, that I chose to tell about it, but because I thought those who listened to me would be able to set me right where my experience had led me wrong. One can hardly ever be certain that he is right, if the experiences of life have been learned correctly. And this is especially true of farming, as we all know. It will, therefore, be a favor to me to have the most liberal criticism that can be given, and it will be taken in the kindest way.

I set out with this fundamental principle, that a proper condition of the soil is the beginning of all good farming. And the first step towards this, is good plowing. I learned from the good book, where we learn all good things, that the sower who sowed seed, got the best returns from seed sowed on "good ground," but that sowed where "they had no deepness of earth," came up quickly, but were "soon scorched because they had no root." I have my ground plowed at least seven inches on the land side, and have the subsoil plow run down at least five or six inches in the furrow below this, leaving the subsoil in its own bed, being merely loosened up. In this way, there is six from twelve to fourteen inches of loose ground, for the plant roots to grow down into for moisture in case of drouth, and a porous subsoil to receive the water in case of heavy rains. It is almost incredible what an immense amount of water will be held in the ground prepared in this way, stored against drouth, ready for use, and being thus absorbed, prevents surface washings in time of heavy rain. Then in plowing, narrow even furrows are insisted on. I was taught that the share of the plow should cut all, or nearly all, of the ground, and there should be little or no breaking over of the earth between the furrows. In order to this, straight furrows are necessary. No man can be called a good plowman who gets his furrows crooked; it shows that he is either too careless or too lazy to attend to his work. I have seen farms that were considered worn out, made to bring forth good crops, simply by being well plowed. It needs no proof that it takes longer to exhaust six inches of soil than three. It is best always to plow deep for all crops. It may not be essential, but it keeps the ground friable and in better condition, and it is harder to plow after being once plowed shallow.

The next point is how to keep up the fertility of the soil. How can we best repair the waste occasioned by the crops taken off. I will say frankly I never use what are called "commercial fertilizers." I think the benefit derived from them deceptive and illusory. I have never seen anything that would take the place of good barnyard manure. Decomposed vegetable and animal matter is the basis of all plant growth. You may produce an artificial vitality in the soil by the use of stimulating compounds, but just as in stimulated animal life, it is unhealthy, because unnatural. The ground should produce good crops, from its natural healthy condition. To get it in this condition and to keep it here, is the great desideratum of farming. And to this end, two most important things must be considered. It must have plenty of manure and occasional rest. The land must have food

and rest as well as animal life. The land is rested when put down in grass that will form a compact dense sod. You may then pasture it, and stock will thrive and fatten on it, and fertilize the ground at the same time, and after five or six years plow it up and see what a grand good crop of corn it will raise. Fields need a rotation of rest as well as a rotation of crops. Then we get the application of manure as a top dressing in these pasture lands, which shows us the natural and proper way of applying it. I learned from this to put manure on my corn ground in the fall and winter, and the difference between that put on at this time and that put out in the spring, as shown in the corn, is so apparent that the man that runs may see it. I believe that fully one-half the value of the manure is saved by putting it on in time to have the winter rains carry its substance down into the soil, rather than plowing it under in the spring, and have it wasted in the subsoil below. I have not found that the substance of the manure is carried off the ground, to any very great extent, by the rains; not nearly so much as when left in the barn yard to be leached out there, with definite waste. For hay there is nothing that pays so well as a top dressing of manure. The addition of lime, which has the property to render plant food available to plant growth, is in many cases of great benefit, besides sweetening soil that has become soured from any cause. And I have found it very destructive of sorrel, I suppose by neutralizing the acids on which it thrives. I am under pretty definite impressions that commercial fertilizers, foster the growth of this plant. I am not sure of this, but it will bear investigation.

Another thing I have learned, that sheep are the greatest weed killers that can be put on a farm. If you have a foul field, put sheep on it, and let them stay there, and crop it close, so that not a single weed can go to seed. They thrive on the close cropped grass and weeds, and make the soil rich and clean at the same time. The poisonous ivy is medicine for them, and briars and offal growth of all kinds are their food while in their young and tender state. They are regular farm scavengers and turn those things that are pests into cash.

Conceding that we must keep up and improve the fertility of our farms, the next question is, how can we do this, and at the same time sell enough of the product to realize a profit? If I sell my hay, corn, oats, etc., where would I get manure to restore exhaustion caused by the raising of these crops? Can we buy the manure to repair the waste in raising crops and have a profit left? You analyze the body of an animal and find out of what it is constituted, and then ascertain food substances containing these same elements and in the right proportion. You feed a cow or horse on this concentrated food and it dies. You find the animal wants something that is surplus to food, something to fill up the stomach, even if it has not much nutriment in it. It needs corn fodder, or wheat straw, or some other rough substance to work on, and to fill up the stomach. The same is true of the soil, it needs something to make it friable and black. The concentrated fertilizer kills the soil, just as the concentrated food kills the animal, if used alone. Then, again, can I afford to sell my cattle and sheep to the butcher, and buy it back as beef and mutton, with his profits added? On its face, is it not just as reasonable for me to sell my corn, oats and hay, and buy it back as manure? I hold that we must keep enough stock on our farms to consume and convert into manure a quantity sufficient to repair the waste of the soil caused by the raising of the crop. The surplus stock may be sold, and thus the law of supply and demand is met. We must not forget that profits are not

always shown in an improved bank account, but the improved productiveness of the farm may amount to more than the cash. Just as we deplete the productiveness of the soil, we are drawing on our capital in business, and this way cover our cash balance. We cannot count profits till we can show that our original capital is intact. It is in this way, I think, many of our farmers are deceived by the use of stimulating compounds, which draw on the original fertility of the soil, until little or none is left. Its rich blackness is gone, and the money is gone into the pockets of the fertilizer man.

Why should not the farmer be independent, having the resources in himself? Why should I blame others and Providence for my improvidence? The drouth kills my crop and I blame Him who sends rain on the evil and the good, when I alone am to blame for giving my plants no deepness of earth in which to find moisture. I wear out my land by continual use, when it is decreed that the land shall have its sabbaths as well as man and beast. We seek all manner of devices to make the earth yield up her stores, until they are exhausted, and then blame the bounteous giver of all good because they are no more. I do not believe after six thousand years of agricultural experience, which this world has had, that he will find many very startling improvements over the past. Indeed while the hue and cry is going up on all hands that farming don't pay, may it not be better to go back to methods, in vogue when it did pay. With all of our boasted improvements, three things will remain fixed as essential to all successful farming, deep soil, plenty of manure, and occasional rest.

It may not be out of place to add one item of experience to these general thoughts. I have learned by practical tests, that the raising of roots, such as beets and turnips, is of great value to the raiser of stock. I would hardly know how to get through a winter, without my root cellar full of sugar beets. There is nothing my cows relish more than their daily ration of beets. And to these as much as anything else, I attribute their continual healthy condition.

And then for ewes raising lambs, there is nothing I know of equal to them. Then, the large quantity of beets you can raise to the acre, is a comfort to those who raise them. I have thirty tons from three acres this year, by actual weight, and this has been about the average crop with me. I raise the deep growing sugar beet, and not the large woody mangel wurzel. There is as much difference between them as between clover hay and wheat straw. It takes deep rich soil to raise beets successfully, with early planting, and cultivation at the proper time. Plow deep and plant early, as soon as you can get the ground ready, put in plenty of seed, and get them thinned to ten inches in the rows before the weeds get started, and you will be surprised how easy it is to raise them. Put plenty of good barn-yard manure, especially cow manure, on the ground intended for beets, in the fall or winter, and some good stimulating compost in the rows when you plant the seed to push them ahead at the start, and the result will make your heart glad. They are easily kept through the winter, if not kept too warm. To those who keep cows, either for butter or milk, let me say there is no mistake about beet raising. They add to the delicious flavor of both butter and milk, and if you feed your cows one month with, and one month without, you will not be puzzled to know how much has been added to the quantity. I conclude by saying it is poor comfort to the farmer to get a poor crop of anything, and as a rule a poor crop is indicative of poor farming; and the better the farming, the bigger the crop, and the larger the crop, the more money.

FRUIT—ITS CULTURE, CARE AND PROFIT.

By SAMUEL BREEM, *Biglerville, Pa.*

(Read at Gettysburg Institute.)

Will take the apple first. Suitable ground should be chosen. A deep gravel soil, somewhat rolling, I think, is best. When land is too level it is apt to be too wet. When trees are to be planted the sod should be destroyed. I think the soil is in good condition after being farmed in corn. The ground should be well manured or fertilized and ploughed up deep and well harrowed and pulverized, and then laid off in straight rows and the holes should be dug from fourteen to sixteen inches deep, and then filled up with top soil until the hole is the depth required and also should be made wide enough to admit all the roots without doubling around. Distance should not be less than thirty-five feet apart each way. In planting all carefulness should be used in getting fine ground to the roots, and press down well to the roots. I would recommend puddling. The water should be made quiet thick with ground, which will stick well to the roots. In the spring of 1888 I planted an orchard of two hundred and fifty trees, taking this plan, and did not lose one tree. Had my ground in the above described condition. Before planting be very careful to get good trees and such varieties as will be most profitable. They should be cultivated at least two years as you would corn or potatoes. I would recommend potatoes where the soil is adapted for them; after that it may be farmed in its regular order by shallow ploughing near the trees. All carefulness should be used in farming around the trees, so as not to skin or bruise the tree. If you cannot do it yourself get a careful man in your place. After the tree begins to bear it should not be farmed with the barshear plow. I would recommend top cultivating with the spring tooth harrow or corn cultivator, also top dressing of barnyard manure or some good chemical fertilizer. Pruning is also a very important part; should avoid as much as possible not to fork tree as they are apt to split; should be kept up so that you can get under with a medium-sized horse. It is also important to examine the roots once a year at least, as the apple tree is subject to the borer, especially the Pound and King apple. The suckers should be taken off in July or first of August; can then be taken off very easily. If left until spring it is double the labor, and has taken the subsistence from the fruit and tree. This is an important point. I think it a good plan to remove all faulty apples that fall. Some professor gives his experience on this point. He makes it a matter of great importance to take all faulty ones, commencing in August, and keep them cleaned up, and either bury or burn, so as to destroy the insects.

Will give a few points on its care. As soon as the apple is fit for use should be taken up; the first may be used for vinegar. If you have more than you can use or sell at a low price, maybe you have some neighbors that have none and are not able to buy; tell them to come and get them, so as to get them away. Better do that than let them rot under the trees. Should not be picked off the tree too early, as they are more apt to rot. The Baldwin and some other varieties may be picked from the middle to the last of September; the York Imperial the second week in October. Should be kept in barn or shed until cold weather, or may be kept in the orchard by piling on

rows about three feet in center and cover with corn fodder. My experience is those kept in the stables and on the ground by putting some straw under them keep more firm than on the floor. Have put on an over jet that has no tight floor, put a quantity of straw under, but the air getting through caused them to wilt more than those on a tight floor. I put them from two and one-half to three feet thick. Some people are afraid of getting them too thick; this does not cause rot. They may be put in the cellar when picked with safety. If the cellar is not kept foul and sultry it should be kept cool and dark. Last fall I sold to A. J. Koser & Son, of Sunny Side, over five hundred bushels, which were put in the cellar from the trees when picked, to the depth of over six feet. I told him that I was afraid he was getting them too thick. When he had taken them out I asked him how they kept; he told me that they kept well and that the center of the pile was the best. It will save a great deal of labor to put them in the cellar when picked. Be careful to know that you have the right kind of a cellar, as the apple should be kept as cool as possible, just so they do not freeze. I have noticed that when there are a few days of warm wet weather, that they rot so much faster than when it is clear and cool. Have sold to different parties the same variety: some would tell me that they kept well and some would say that they did not keep, showing neglect or care.

Will give my experience in the profit of the apple. The orchard that I will refer to contains eight acres, two hundred and seventy trees, thirty-five feet apart each way. It was planted and raised by A. J. Koser, of whom I purchased the farm five years ago. He deserves all the credit of so carefully planting, pruning and taking care of it. Was planted about twenty-one years ago and farmed in its regular order until it came into bearing. Mr Koser had three crops that were worth from nine to twelve hundred dollars; since I own it I had crops worth from twelve to fourteen hundred. Last year had 3,680 bushels, which were worth \$1,400. I have summed the whole amount, averaging Mr. Koser's crops \$1,000 each, and my three crops \$1,300 each, making \$6,900. We generally have on the off year 500 or 600 bushels worth from \$1.50 to \$2.00 a bushel, which will pay all expenses of gathering the large crop. In the five years that I own it I spent \$60 for fertilizers, and top dressed once with barn-yard manure, which I value the same. Am taking off each year fully one-third of a crop of hay, so you see my ground is not all lost that I have in orchard. Have in my orchard 100 trees that have not been worth \$50 a year. They are 85 York Stripe and Early Ripes. Had 78 of them top grafted with York Imperial that will come into bearing in a few years on the Early Ripes, Seek-no-Further and Benoni, so you can see that more than one-third of my orchard has not been at all profitable. While on some soils the York Stripes are profitable, and are a good market apple, the York Imperial is by far the most profitable to me on account of its wonderful bearing and good keeping quality. From 84 trees picked last fall I had over 1,800 bushels. The Baldwin is also a profitable apple on account of its good bearing and cooking and eating qualities. They are one of the leading market apples, do not keep so well and commence to fall early. The Greening is also a very good apple, not as good a bearer as the Baldwin, and keeps almost equal for fall use. I would recommend the Maiden Blush, Porter and Seek-no-Further; they are all good cooking and marketing apples. For a summer apple the Red Astrachan has been profitable to me on account of its earliness. Don't think that

many summer apples are profitable, as we don't have time to market them, and so often the market is overstocked with no sale for them. A few trees of summer varieties is all we need.

Have now given the profits of my orchard. Perhaps some will say "but your orchard comes in on the off year." But I will be liberal and divide one-half; and what can we do better on that much ground than plant an orchard, making use of valuable varieties and taking good care of it. Do not, after you have planted, let the live stock break them down as some people do. We might as well expect to raise a crop of wheat or corn with the cattle in it as an orchard. A good orchard adds greatly to the value of the farm. I would advise all farmers to be interested in fruit growing. I have so often been asked why it is that this orchard bears on the off year and others do not. I cannot tell why, but I can tell how. When it came into bearing it was not so. After the apple was formed and about as large as a cherry, there was a frost and every one fell off. The next year it bloomed and had a good crop, and has done so ever since. I hope it will remain so.

WHAT IS THE DIFFERENCE BETWEEN HOUSEKEEPING AND HOMEMAKING?

By Mrs. HANNAH KENDERDINE, *Lumberville, Pa.*

The question submitted to me pre-supposes a distinction between a homemaker and a housekeeper, but Webster describes as follows: Homemaker, one who stays at home, not gadding; and housekeeper is one who has charge of the domestic concerns. A housekeeper has a financial value, and may perform their duties for from two to five dollars per week, while the homemaker fills a position not estimated at any value. It is thought by some that the labor connected with housekeeping is mere drudgery. It need not be made so any more than any other calling, for "all labor is holy." A housekeeper's life is one of routine and form, so each day, each week, brings its work, only varied with the seasons of the year. But while they who are so constituted, and their environments are such that their endless round of duty from garret to cellar can never afford for them apparently one moment's leisure surely are to be pitied. There are those who have the domestic machinery to move so easily and quietly that the sense of the drudgery of work seems lost; and in order to mete out perfect justice to all the household it is necessary that each one shall recognize systematically the wants and needs of each other. It is not an easy matter to learn that the proper amount of time shall be allotted to each duty in which each member bears a part, that there is time for everything and everything is ready in time. This lesson learned is the secret of orderly housekeeping.

Some housekeepers keep house so severely that standing room is scarcely afforded for the family, and this extreme destroys the home feeling. But the homemaker must be well qualified to fill the many callings that sooner or later devolve upon her. In the first place she

should have some knowledge of the art of cooking, for a good cook has a high art; by and through that calling comes the best conditions for domestic happiness. A daintily-served, well-cooked dinner may be just as much a proof of the superior refinement and culture of the individual as any intellectual attainment. A hireling can never take the place of the home mother, and every home mother who is interested in making and keeping the home must live near economy, and away from extravagance. Some have an over-fondness for music, others for china, bric-a-brac and upholstery, but in gratifying these tastes do not let what other people can afford be any guide for you, for the happiness of home depends very largely upon owning it, and the feeling of dependence which that feeling of absolute and unmortgaged ownership brings with it. Convenient and elegant furnishings are very desirable accessories when the housewife and mother can fill them with the home feeling. Home is not a name, nor a form, nor a routine. It is a spirit, a presence, a principle. Material and method will not and cannot make it. It must get its light and sweetness from those who inhabit it.

THE NEED OF COMMENT ON INSTITUTE ESSAYS.

By EDWARD IVINS, *Langhorne, Pa.*

(Read at Langhorne Institute.)

"How are we to derive the most benefit from the essays we hear read?" is a question which needs consideration. Whether it is best to give our attention to the reading and pass it by without comment, or, believing that the author has embraced so much and treated the subject so fully that any remarks by another might detract rather than add value to the article itself. I think there are occasions when the pursuance of this course is the judicious one for various reasons; but even then it seems as if the author must feel there was little strength of argument and less merit contained in the essay: or, with presumption, assume that it was a master-piece and is approved by the entire audience because no one expressed any opposition to the plan of carrying out the idea, and silence gives consent.

Some contend that time is of times wasted in heated discussions, which we admit, if carried to excess. Because I approve of criticism and comment is no more worthy the approval of others, unless it is their honest opinion, than I should approve and endorse all I may hear. One mind could not conceive and dictate the formation of a good form of government for the people, but the voices of that people must be heard by consultation and interchange, and the best ideas expressed, united upon and approved. If one of our Bucks county farmers here should have an article on taxation and claim that real estate should pay all the tax, all other property to be exempt, and that essay passed out of the hands of its author without comment or controversy, we would probably see in our city papers before the close of the week an account of this meeting somewhat in this wise: "At a farmers' institute held at Langhorne, under the authority of the State Board of Agriculture, a paper was read by one of those farmers advising

the powers that be, to have real estate pay all the taxes, which appeared to be the unanimous sentiment of that large gathering of farmers, for there was not a voice raised in opposition to it," thus placing us falsely before the world. Time was when it was a trite saying, "The Yankees are a people of great knowledge," and much of it acquired by asking questions, discussion and consultation; and it seems evident to me that is the proper plan to gain the most advantage from anything we may hear—to ponder, to weigh, to discuss and to question.

It is rather discouraging, for a farmer at least, to use his best endeavor to prepare and write an essay, in which research and statistics may have been needful, and much time employed by the theme treated, so that it shall not be discreditable to the author, and, if possible, worthy of a professed higher calling to read it in the presence of a large audience, and not a word of comment pro or con, and when it is thus passed unnoticed, the author, with a semblance of justice may thus soliloquize: "My! but I hit the nail, and embodied every body else's opinion with my own, for all seemed to approve it," or, "I am sorry I made such a dunce of myself, as to attempt to write and read anything here, for it is now plain that it is not appreciated; even those of known opinions averse to what I have advocated do not deem it worthy of remark," or, others may refrain from criticism, for fear of giving offense or of hurting the feelings of the author. This is a delicate matter with us, and the feelings of the essayist should be respected. Therefore would say it is the ideas advanced that are subject to comment and not the manner of expression.

As this is not an essay on any particular subject relating to farming, and there are others that will instruct us, I do not wish to consume time that may be more profitably spent in their perusal and discussions; hoping what I have said may cause a feeling of freedom for all present to participate. With full belief in the old proverb, "Our best friends are those who tell us of our faults and teach us how to correct them," we will deem those having the ruling of this meeting, our best friends, and, if we err by too much speaking or by too much silence they will call us to account. If any shall receive any profit, or if what I have said shall be the means of making our meeting more instructive, pleasant and profitable, I feel that I am rewarded for the mite contributed.

TABULATED ANALYSES OF COMMERCIAL FERTILIZERS.

From samples selected in accordance with the provisions of the act of June 28, 1879, by the State Board of Agriculture or its agents.
Analyses by DR. WM. FREAR, Chemist of the Board, and of the State Experiment Station, State College P. O., Pa.

QUARTERLY REPORT.

COMPLETE FERTILIZERS.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
637	A. Anstine, Stewartstown, Pa.	Phosphate for Potatoes.	Stewartstown.	May	19.	9.63	6.82	1.48	1.76	5.75	2.19	\$31.72	637
635	"	Gibson's Bone Phosphate.	"	June	4.	4.92	5.54	2.42	5.58	2.39	2.37	30.93	635
639	Allegheny City Fert. Co., Alleghy City Pa.	Raw Bone Phosphate.	Nineveh.	"	4.	5.14	5.14	3.67	2.68	1.81	5.23	40.91	639
641	Baugh & Sons Co., Philadelphia, Pa.	Corn Fertilizer.	Seitzland.	May	19.	12.07	6.25	2.32	2.32	0.37	1.40	25.33	641
587	D. Blocher & Co., Gettysburg, Pa.	Dissolved Bone and Potash.	Mifflin.	"	13.	11.96	7.99	1.50	1.13	2.39	2.09	29.88	587
673	"	High Grade Phosphate.	Gettysburg.	June	4.	7.79	8.40	2.90	3.76	1.54	1.25	30.19	673
653	E. K. Bollinger & Co., Seitzland, Pa.	Ammoniated Bone Phos.	Glen Rock.	May	16.	12.52	7.54	1.64	0.61	1.13	0.90	25.38	653
654	"	Rising Star Phosphate.	Seitzland.	"	26.	10.21	7.62	4.99	1.02	0.38	0.89	28.16	654
613	Bowker Fertilizer Co., Boston, Mass.	Stockbridge Man. for Potatoes	Newport.	"	19.	8.86	5.33	1.08	2.91	6.73	3.80	38.49	613
614	Bradley Fertilizer Co., Boston, Mass.	Potato Fertilizer.	"	"	19.	13.83	7.34	2.36	1.92	3.34	2.31	32.19	614
620	"	Niagara Phosphate.	Lititz.	"	19.	9.51	6.08	2.25	1.63	1.88	1.70	26.87	620

625	Bradley Fertilizer Co., Boston, Mass.	Patent Super-Phosphate.	Lititz.	May	19.	12.08	6.99	2.79	3.26	1.73	2.13	\$31.19	625
627	"	Dissolved Bone and Potash.	"	"	19.	10.09	7.15	2.48	1.17	2.45	1.17	27.19	627
712	"	Potato Manure.	Mansfield.	June	30.	10.74	7.51	2.11	2.06	3.11	2.31	31.91	712
713	"	Dissolved Bone and Potash.	"	"	30.	8.87	4.35	3.56	2.38	2.45	1.40	24.78	713
714	"	Vegetable Phosphate.	"	"	30.	12.70	7.61	2.00	1.79	2.72	2.57	32.89	714
716	"	Sea Fowl Guano.	"	"	30.	10.84	7.76	2.12	2.04	2.19	2.12	30.74	716
575	Brown & Gilman, Philadelphia, Pa.	Bone Phosphate No. 5.	Philadelphia.	May	13.	11.29	6.31	1.22	2.06	2.01	1.87	25.94	575
577	"	No. 4 Super-Phosphate.	"	"	13.	14.60	6.51	1.85	2.59	2.33	1.89	28.08	577
578	Christian & Co., Philadelphia, Pa.	Peruvian Guano.	Williamsport.	"	13.	9.78	0.78	4.57	12.35	4.40	6.58	49.88	578
592	Crocker Fertilizer Co., Buffalo, N. Y.	Ammoniated Bone Phos.	"	"	13.	10.43	4.74	6.16	3.11	0.88	2.66	33.84	592
606	"	Potato and Tobacco Phos.	"	"	19.	14.40	7.69	2.05	1.90	3.57	1.82	30.74	606
663	"	Special Potato Manure.	Stewartstown.	June	11.	7.54	6.59	1.88	1.40	6.85	2.29	33.16	663
708	"	"	Mansfield.	"	30.	9.41	4.70	3.74	0.75	5.29	4.09	38.10	708
710	"	Wheat and Corn Phosphate.	"	"	30.	13.28	6.49	3.31	2.04	1.67	2.05	29.86	710
711	"	Vegetable Bone Phosphate.	"	"	30.	8.62	5.06	1.82	1.26	8.01	4.38	43.07	711
579	Eureka Fertilizer Co., Perryville, Md.	Potato and Vegetable Phos.	Avondale.	April	22.	6.54	9.37	1.80	2.22	1.44	2.02	32.32	579
645	"	Farmers' Favorite Phos.	Stewartstown.	June	4.	11.46	9.03	1.99	2.11	0.95	1.54	29.77	645
664	"	Imperial Bone Phosphate.	"	"	4.	9.76	8.78	2.42	2.27	0.88	1.08	28.02	664
672	"	Alkaline Bone and Potash.	Hanover.	"	4.	13.23	7.56	2.87	2.84	0.90	2.21	22.31	672
703	"	General Fertilizer.	Big Bend.	"	1.	9.89	7.47	1.10	1.88	3.82	1.50	27	703
717	Great Eastern Fertilizer Co., Rutland, Vt.	Tobacco and Vine Phos.	Covington.	"	11.	12.30	6.21	2.23	1.59	3.43	1.82	28.21	717
718	"	General Fertilizer.	"	"	11.	17.01	6.26	2.16	1.20	4.16	0.97	25.30	718
719	"	Wheat Special Phosphate.	"	"	11.	17.94	6.14	2.55	1.32	2.06	2.33	29.23	719
572	M. M. Grove, Perdix, Pa.	Meal and Bone Fertilizer.	Harrisburg.	April	13.	5.41	0.16	11.00	4.26	...	5.55	44.38	572
631	Griffith & Boyd, Baltimore, Md.	Ammoniated Soluble Bone.	Wrightsville.	May	19.	11.38	6.20	1.57	2.41	1.92	1.22	23.96	631
582	"	Valley Fertilizer.	"	"	19.	12.11	6.47	2.48	1.99	2.27	0.72	23.96	582
590	S. M. Hess & Bro., Reading, Pa.	Ammoniated Bone Phos.	Tyrone.	"	13.	11.35	5.72	1.99	1.65	1.14	1.89	25.37	590
671	S. H. Howitz Philadelphia, Pa.	Azotized Dissolved Bone.	Gettysburg.	June	4.	5.27	3.35	2.69	1.58	1.24	1.31	21.40	671

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
586	Lackawanna Fertilizer Co., Moosic, Pa.	\$25 Phosphate.	Towanda.	May	7.70	2.06	2.43	3.32	1.75	1.56	20 49	25 00	586
570	"	Potato and Corn Manure.	Scranton.	April	10.65	3.91	4.79	2.60	6.34	2.08	33 39	40 00	570
621	Lancaster Chemical Co., Lancaster, Pa.	Tobacco and Vegetable Fert.	Ephrata.	May	6.83	5.83	2.11	2.25	6.31	3.14	37 39	30 00	621
670	Leib & Shirey, Stewartstown, Pa.	Corn Phosphate.	Stewartstown.	June	6.16	5.25	1.97	1.12	4.22	1.49	25 47	25 00	670
617	Leibig Manfg. Co., New York.	Potato and Corn Phosphate.	Lebanon.	May	10.07	5.04	4.37	1.14	6.73	2.26	33 36	35 00	617
618	"	Sun Phosphate.	"	"	12.68	0.70	11.15	2.40	0.94	1.18	28 86	25 00	618
635	Lister Agl. Chemical Works, Newark, N. J.	Standard Bone Phosphate	Stewartstown.	"	10.95	6.37	3.22	3.51	1.87	2.45	32 13	29 00	635
648	"	Harvest Queen Phosphate.	Glen Rock.	"	10.02	8.99	2.44	1.45	1.08	1.95	32 40	26 00	648
658	"	Ann. Dissolved Bone Phos.	"	"	8.62	9.31	1.58	0.88	2.90	2.65	35 37	29 00	658
601	"	Celebrated Ground Bone.	Tyrone.	"	11.86	0.26	4.05	9.20	"	2.93	27 21	30 00	601
642	Lord & Polk Co., Odessa, Del.	Champion Fertilizer.	Stewartstown.	"	10.87	6.48	2.75	1.91	1.85	1.51	27 28	25 00	642
611	Maryland Fertilizing Co., Baltimore, Md.	Ammoniated Bone Phos.	New Bloomfield.	"	12.83	7.10	1.78	1.87	2.07	1.92	28 24	28 00	611
612	"	Linden Phosphate.	"	"	12.77	9.33	3.12	0.51	2.06	"	25 98	23 00	612
574	Mapes Fertilizer Co., New York.	Manure for General Use.	Philadelphia.	"	9.48	6.86	1.57	4.08	4.20	3.88	38 35	40 00	574
573	"	Manure for Potatoes.	Williamsport.	"	8.55	8.08	0.79	1.15	8.07	3.99	43 59	43 00	573
595	Michigan Carbon Works, Detroit, Mich.	Homestead Fertilizer.	"	"	10.97	7.87	1.40	1.06	2.15	2.75	31 68	34 00	595
679	H. S. Miller & Co., Newark, N. J.	Special Potato Manure.	Greencastle.	June	8.64	8.43	0.73	0.42	6.60	3.87	41 44	39 00	679
707	Milsom Fertilizer Co., Buffalo, N. Y.	Vegetable Bone Phosphate.	Canoe Camp.	"	11.59	6.44	1.75	2.53	3.93	2.97	33 25	32 00	707

705	Milsom Fertilizer Co., Buffalo, N. Y.	Dissolved Bone Phosphate,	Canoe Camp.	July	3.	7.03	5.38	3.61	1.76	1.34	\$24 22	\$22 00	705	
651	Patapasco Guano Co., Baltimore, Md.	Ammoniated Corn Fertilizer,	York.	May	26.	9.04	7.51	2.78	2.65	2.41	28 89	22 00	651	
656	..	Grange Mixture.	..	..	26.	12.94	8.83	1.72	1.56	1.63	30 16	27 00	656
650	..	Potato Producer.	Seitzland.	..	26.	10.14	7.17	2.43	1.61	4.92	31 14	27 00	655	
656	W. S. Powell, Baltimore, Md.	Standard Phosphate.	Mifflin.	June	13.	16.13	7.00	1.42	0.74	3.85	25 21	28 00	589	
589	Read Fertilizer Co., New York.	Farmers' Friend Phosphate.	Mainburg.	..	30.	6.82	7.43	2.40	1.59	1.98	30 45	35 00	724	
724	..	Standard Phosphate.	..	..	30.	10.80	7.51	1.00	0.61	4.45	26 95	32 00	725
725	..	Leader Guano.	..	..	30.	10.49	6.85	1.44	1.10	2.70	24 98	32 00	727
727	..	Tip Top Sol. Bone and Potash.	Glen Rock.	June	4.	12.91	9.38	3.50	0.99	1.81	26 31	23 00	600	
600	Scott Fertilizer Co., Elkton, Md.	Standard Phosphate.	..	..	4.	9.36	6.23	2.20	2.02	2.91	26 24	27 00	659
659	..	Ann. Bone Phosphate.	Williamsport.	May	13.	12.36	0.75	4.46	1.42	1.26	17 27	24 00	591	
591	E. A. Sharretts & Co., Baltimore, Md.	Corn Guano for Potatoes.	..	..	13.	11.53	4.11	2.15	1.30	2.00	20 93	32 00	528
598	..	Corn Guano.	Philadelphia.	July	3.	8.62	2.78	0.83	5.38	4.86	36 56	34 00	739	
600	..	Standard Fertilizer.	..	..	3.	10.99	4.32	0.98	2.89	5.80	32 45	39 00	731
730	Shanley & Van Brunt, Philadelphia, Pa.	Potato Guano.	3.	11.39	3.40	1.43	5.40	2.66	1.95	25 17	27 00	732
731	..	Slaughter House Fertilizer.	Kingston.	May	13.	12.14	7.25	1.64	2.03	5.02	35 86	39 00	583	
732	..	Tampico Guano.	13.	13.27	4.58	4.31	3.57	2.39	1.29	27 04	35 00	584
583	Sharpless & Carpenter, Philadelphia, Pa.	No. 1 Bone Phosphate.	Waynesboro.	July	3.	11.24	1.08	4.97	1.41	7.13	25 42	25 00	729	
584	..	Excelsior Fruit Producer.	Johnstown.	May	28.	5.41	2.46	3.63	9.09	1.89	27 22	30 00	634	
729	J. D. Shumons, Hagerstown, Md.	Farmers' Alliance Phos.	..	..	28.	8.81	1.56	4.22	8.85	0.29	26 53	25 00	701
634	South-Side Fertilizer Co., Johnstown, Pa.	Eagle Phosphate.	26.	14.91	6.41	3.28	2.48	1.59	1.29	27 07	28 00	647
701	..	Jay-Eye-See Phosphate.	Stewartstown.	..	25.	10.27	7.57	2.57	0.63	1.20	1.20	25 94	28 00	582
647	Reuben Sprengle, Red Lion, Pa.	XXV Phosphate.	Jenners' X Roads.	April	4.	9.38	6.91	3.44	1.67	1.60	1.54	28 24	30 00	677
582	Susquehanna Fertilizer Co., Baltimore, Md.	Bone Phosphate.	Allenwald.	June	19.	12.97	9.47	2.37	0.84	2.27	1.17	29 56	35 00	594
677	..	Farmers' Choice Phos.	Clearfield.	May	19.	15.08	9.59	2.93	1.49	..	0.62	26 67	25 00	602
594	I. P. Thomas & Son Co., Philadelphia, Pa.	Improved SuperPhosphate.	19.	13.15	7.59	2.00	2.63	2.99	1.96	30 65	32 00	596
602	..	High Grade Phosphate.	Williamsport.	..	19.	10.55	5.50	2.69	1.76	2.64	1.96	27 70	30 00	615
596	James Thomas, Williamsport, Pa.	Star Bone Phosphate.	Newport.	..	4.	12.13	7.24	2.21	2.68	1.78	31 19	26 00	686	
685	Tygart-Allen Fertilizer Co., Phila., Pa.	Old Pittsburgh Phosphate.	Hanover.	June	..	..	..	..	..	..	..	..	..
686	Joshua Walker, Baltimore, Md.	..	..	..	..	..	..	..	..	..	..	..	..

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
638	R. A. Wooldridge & Co., Baltimore, Md.	Honest Dollar Phosphate.	Stewartstown.	May	19.	10.23	8.56	2.58	1.11	7.60	41.05	35.00	638
639	"	Quick Step Phosphate.	"	"	19.	10.81	4.31	3.78	3.99	3.81	30.08	27.00	639
645	"	Silver Grey Phosphate.	Somerset.	June	4.	6.91	2.10	4.61	6.37	2.77	24.90	22.00	645
588	"	Kangaroo Complete Compound	Mifflin.	May	13.	12.34	4.42	4.48	3.98	4.65	30.99	28.00	588
720	Wilkinson & Co., New York.	Bone Fertilizer.	Mansfield.	June	30.	11.65	5.06	2.10	0.87	3.16	23.14	30.00	720
607	Williams & Clark Co., New York.	Royal Bone Phosphate.	Newport.	May	19.	16.86	5.45	2.99	0.48	2.36	24.90	30.00	607
609	"	Diss. Bone and Potash.	"	"	19.	11.96	8.48	2.69	1.61	2.40	25.18	25.00	609
608	"	American Potato Phosphate.	"	"	19.	11.31	5.21	1.79	1.24	5.22	30.97	36.00	608
721	"	American Potato Phosphate.	Mahansburg.	June	30.	10.65	4.87	1.82	1.34	5.48	29.91	38.00	721
722	"	Royal Bone Phosphate.	"	"	30.	15.74	5.39	2.42	1.98	2.11	24.27	30.00	722
604	Isaac Yearsley, Coatesville, Pa.	Chester Bone Phosphate.	Tyrone.	May	19.	11.98	9.93	2.97	1.41	1.69	31.83	35.00	604
651	E. H. Ziegler & Co., Stewartstown, Pa.	Bone Phosphate.	Stewartstown.	June	4.	8.79	5.66	1.15	1.58	2.65	27.62	26.00	651
662	"	Potato Phosphate.	"	"	4.	7.36	4.34	1.04	1.54	10.54	32.30	27.50	662
687	Zell Guano Co., Baltimore, Md.	Calvert Guano.	Somerset.	"	4.	10.49	9.01	2.00	1.98	1.83	28.07	30.00	687

ACIDULATED SOUTH CAROLINA ROCK.

ACIDULATED SOUTH CAROLINA ROCK.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
675	Baugh & Sons Co., Philadelphia, Pa.	High Grade Diss. S. C. Rock.	Mercersburg.	June 4.	5.92	10.72	3.55	1.63	\$23.11	\$18.00	675
684	J. K. Beeson, Uniontown, Pa.	Uniontown Phosphate.	Uniontown.	May 28.	3.13	0.22	9.81	3.73	16.52	..	684
667	E. Frank Coe, New York.	Soluble Bone.	Hanover.	May 26.	9.12	10.13	2.80	2.64	21.50	20.00	667
580	Eureka Fertilizer Co., Perryville, Md.	P. and P. Acid Phosphate.	Avondale.	April 22.	3.70	12.50	2.37	2.55	24.55	15.50	580
734	S. M. Hess & Bro., Reading.	Acid Phosphate.	New Bloomfield.	July 7.	5.73	9.65	3.28	1.40	20.95	21.06	734
622	Lancaster Chem. Co., Lancaster, Pa.	Diss. S. C. Rock.	Lancaster.	May 19.	10.03	10.06	3.29	1.45	21.61	20.00	622
728	Liebig Manufacturing Co., New York.	High Grade Acid Phosphate.	Ereldown.	June 26.	8.92	8.28	5.47	2.12	22.30	16.50	728
676	Frederick Phillips, Philadelphia, Pa.	Soluble Bone Phosphate.	Mercersburg.	June 4.	12.55	11.63	2.04	0.63	21.98	18.00	676
698	Quinnipiac, New York.	Sol. Diss. Bone.	Indiana.	May 28.	8.78	9.40	3.92	1.96	21.87	22.50	698
565	Read Fertilizer Co., New York.	Dissolved Bone.	Milton.	April 22.	2.99	7.12	4.92	2.90	19.87	14.50	565
726	..	..	Mahansburg.	June 30.	4.51	8.82	4.67	1.00	21.46	25.00	726
566	..	Diss. S. C. Rock.	Milton.	April 22.	2.34	4.71	5.95	3.29	18.43	14.50	566
64	Scott Fertilizer Co., Elkton, Md.	Tip Top Sol. Bone.	Glen Rock.	May 26.	9.64	11.93	3.10	1.46	24.35	18.00	64
645	Susquehanna Fertilizer Co., Baltimore, Md.	Sol. Bone Phosphate.	Stewartstown.	May 19.	9.82	8.50	3.88	2.55	20.47	18.00	645
593	L. P. Thomas & Son Co., Philadelphia, Pa.	S. C. Phosphate.	Clearfield.	May 13.	13.66	11.03	2.99	1.63	22.84	22.50	593
610	Williams & Clark Co., New York.	Acorn Acid Phosphate.	Newport.	May 19.	11.31	8.28	4.08	1.93	20.21	19.00	610
723	..	Acorn Acid Phosphate.	Mahansburg.	June 30.	11.03	9.14	3.61	1.55	20.66	20.00	723
692	Zell Guano Co., Baltimore, Md.	Diss. Bone Phosphate.	Somerset.	June 4.	6.90	11.89	3.19	1.79	24.56	25.00	692

GROUND BONE.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where selected.	Date of analysis.	Moisture.	Insoluble phosphoric acid.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
636	A. Austine, Stewartstown, Pa.	Ground Bone.	Stewartstown.	May 26, '91	7.04	21.21	4.14	\$32.36	\$30.00	636
715	Bradley Fertilizer Co., Boston, Mass.	Pure Bone Meal.	Mansfield.	June 30, '91	4.06	24.14	3.15	40.38	35.00	715
581	Eureka Fertilizer Co., Perryville, Md.	Fine Ground Bone.	Avondale.	Apr. 22, '91	4.28	20.78	3.88	36.86	30.00	581
568	M. M. Grove, Harrisburg, Pa.	Coarse Bone.	Harrisburg.	Apr. 13, '91	6.05	23.26	4.34	30.12	32.50	568
569	..	Fine Bone.	..	..	5.27	20.83	4.13	34.93	35.00	569
696	Isaac W. Griffith, Johnstown, Pa.	Fine Ground Bone.	Johnstown.	May 28, '91	6.76	25.04	3.63	38.59	35.00	696
650	Hubbard & Co., Baltimore, Md.	Ground Raw Bone.	Stewartstown.	May 26, '91	7.12	20.74	3.85	31.08	29.00	650
563	Index Co., Philadelphia, Pa.	Ground Bone.	Bryn Mawr.	Feb. 6, '91	3.42	26.29	3.39	35.00	35.00	563
571	Lackawanna Fert. Co., Moosic, Pa.	Ground Bone.	Scranton.	Apr. 20, '91	4.91	20.82	3.70	32.36	35.00	571
629	Lancaster Chemical Co., Lancaster, Pa.	Raw Bone Meal.	Lancaster.	May 26, '91	6.19	19.60	5.01	34.77	32.00	629
681	Maryland Fertilizing Co., Baltimore, Md.	Fine Animal Bone.	Huntingdon.	June 4, '91	5.78	20.60	4.85	35.81	36.00	681
706	Milsom Fertilizer Co., Buffalo, N. Y.	Bone Meal (Cyclone brand).	Canoe Camp.	June 30, '91	7.54	23.29	4.16	34.40	35.00	706
648	W. S. Powell, Baltimore, Md.	Bone Meal.	Hanover.	May 26, '91	4.10	24.44	4.06	44.39	28.00	648
697	South Side Fert. Co., Johnstown, Pa.	..	Johnstown.	June 4, '91	6.82	24.15	4.06	34.98	35.00	697
585	Sharpless & Carpenter, Philadelphia, Pa.	..	Kingston.	May 13, '91	7.28	21.47	3.99	39.08	35.00	585
652	M. L. Shoemaker Co., Philadelphia, Pa.	Swift Sure Bone Meal.	York.	May 26, '91	4.65	21.05	6.08	44.28	30.00	652

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